



Semiotics of the Image in Modern Photographic Culture

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ABSTRACT

The article is dedicated to the semiotics of the image in modern photographic culture and examines the transformation of photographic meaning under digital, communicative, and institutional conditions. The relevance of the study is determined by the growing instability of photographic authenticity in environments shaped by algorithmic processing, manipulation practices, and biometric infrastructures. The novelty of the work lies in the systematic differentiation of trace, indicant, and print as coexisting ontological modes of the photographic sign. The article describes the displacement of emphasis from resemblance to physical contiguity and from contiguity to communicative and institutional codification. Special attention is paid to digital photo manipulation, smartphone photography, facial recognition systems, and conceptual documentary practices. The work sets itself the goal of identifying structural shifts in the ontology of the photographic sign and clarifying their implications for trust and interpretation. Comparative analysis, source analysis, and semiotic modelling are used to solve this task. The conclusion outlines the coexistence and tension of semiotic layers. The article will be useful for researchers in visual studies, media theory, art theory, and cultural semiotics.

KEYWORDS: photographic semiotics, digital manipulation, visual literacy, temporality, photographic ontology, visual culture

INTRODUCTION

Photography occupies a paradoxical position in contemporary visual culture. It continues to be perceived as a privileged medium of attestation while simultaneously functioning within environments saturated by digital alteration, algorithmic mediation, and institutional control. The relevance of this study arises from this structural tension. As digital infrastructures expand, the epistemic grounding of the photographic image requires renewed conceptual clarification.

The purpose of the article is to conceptualize the structural transformation of the photographic sign in contemporary culture through a layered model of trace, indicant, and print, and to clarify the ontological implications of their interaction. To achieve this goal, three tasks are set:

- 1) To reconstruct the ontological grounding of the photographic sign through the category of trace;
- 2) To theorize digital manipulation and smartphone photography as transformations of semiotic grammar;
- 3) To interpret biometric and institutional regimes as processes of semiotic codification and designation.

The novelty of the research lies in the development of a layered semiotic framework in which trace, indicant, and print are conceptualized as dynamically interacting ontological modes that structure contemporary photographic meaning. The study integrates philosophical, anthropological, legal, and media-theoretical perspectives into a unified semiotic framework.



METHODS AND MATERIALS

The present study is based on an analytical examination of contemporary theoretical works addressing photography, visual semiotics, digital manipulation, and institutional image regimes.

The photographic sign is examined through a refined trichotomy of trace, indicant, and print, grounding photography in signal-based physical contiguity and establishing the trace as a mode of involuntary registration (Voisard and Margot, 2024). A grammar of manipulated photographs is developed within a social semiotic framework, including a taxonomy of global and local transformations that reconfigure ideational and interpersonal meta functions (Boeriis, 2024). A visual literacy scale for smartphone photography is constructed and validated, demonstrating the operationalization of interpretive competencies in digital visual environments (Kamalvand and Khany, 2024). The concept of "photography without pictures" foregrounds procedural and infrastructural dimensions of photographic production and shifts attention from visual output to technical configuration (Baird, 2024). Photography and temporality are examined through the categories of suspension and temporal fracture, emphasizing the restructuring of temporal experience within the photographic act (Hausken, 2024). The relation between photographic seeing and memory is analyzed, highlighting anticipatory framing and mediated remembrance as constitutive elements of visual perception (Frosh, 2024). Conceptual documentary photography is interpreted as visual enumeration, demonstrating how serial accumulation restructures epistemic authority and redistributes meaning across sequences (Schürmann, 2022). Images are approached from a linguistic anthropological perspective, situating photographic meaning within communicative uptake, circulation, and social interaction (Nakassis, 2023). Facial recognition systems are examined within legal semiotics, showing how institutional frameworks stabilize photographic signs as regulatory instruments and mechanisms of designation (Marino, 2024). The selfie production model integrates capture, editing, and posting into a unified communicative sequence, dissolving the boundary between registration and transformation (Qutub, 2021).

To write the article, a comparative method, semiotic analysis, structural modelling, and source analysis were used. The comparative method enabled the identification of convergences and divergences across theoretical approaches. Semiotic modelling facilitated the systematization of trace, indicant, and print as interacting layers. Source analysis provided the empirical and conceptual foundation for interpreting contemporary photographic practices.

RESULTS

The semiotic structure of the photographic image in contemporary culture reveals a displacement of emphasis from resemblance toward material contiguity, and from material contiguity toward communicative orchestration. The configuration of the photographic sign no longer stabilizes around mimetic fidelity; it oscillates between trace, technological inscription, and socially codified articulation. When photography is examined as a signal-based registration of electromagnetic emission, its semiotic core shifts toward the ontology of the trace rather than toward resemblance. The photographic image functions as the recording of a signal emitted by a referent under conditions of spatial distance and temporal simultaneity, a relation articulated through a trichotomic distinction between trace, indicant, and print (Voisard & Margot, 2024). The refined trace model establishes that the photographic sign emerges not from visual likeness but from physical contiguity at the moment of capture, repositioning photography within Peircean indexicality (Voisard & Margot, 2024). The systematization of semiotic layers is presented below (Table 1).



Table 1. Semiotic differentiation of trace, indicant, and print in modern photographic culture (compiled by the author based on Voisard & Margot, 2024; Marino, 2024; Boeriis, 2024)

Semiotic Category	Mode of Genesis	Relation to Referent	Communicative Intention	Institutional Saturation	Typical Contemporary Example
Trace	Automatic physical registration	Physical contiguity	Absent	None	Raw photonic capture
Indicant	Deliberate recording	Contiguity + design choice	Present	Limited	Edited smartphone image
Print	Regulated and conventionalized recording	Conventionally stabilized determination	Present and codified	Strong	Biometric enrolment image

From this premise, three analytical trajectories become visible. The first concerns the ontological grounding of the image as trace. The second addresses digital manipulation as a reconfiguration of grammatical resources. The third examines the redistribution of agency in algorithmic and biometric regimes. Each trajectory unfolds independently yet intersects in the transformation of photographic trustworthiness.

Within the trace-based framework, the photographic image is anchored in simultaneity: it is inscribed in the “quasi-present” of the referent. The exposure interval constitutes a temporal incision that unifies spatial and temporal coordinates into a single act. Unity, individuality, attestation, and designation follow from this indexical constitution (Voisard & Margot, 2024). The principle of individuality does not imply qualitative uniqueness but numerical singularity; a digital file may be infinitely replicated without dissolving its indexical origin. Such replication, however, introduces layers of metadata and algorithmic mediation that complicate the perception of authenticity. The trace persists, yet its semiotic legibility depends on knowledge of genesis.

A parallel shift appears when temporality is examined philosophically. The photographic image does not merely capture time; it reorganizes temporal experience. Analysis of photography and temporality demonstrates that photographic time is structured through suspension rather than flow, producing a tension between presence and after-effect (Hausken, 2024). This temporal suspension intersects with attestation, yet it also exposes fractures: long exposures masquerading as instantaneous events destabilize perceived unity. Temporality becomes interpretive terrain.

The second trajectory emerges from digital manipulation and the grammar of alteration. The widespread availability of photo-editing software introduces a fourfold taxonomy of pixel-level operations-global modifications, local modifications, global transmutations, and local transmutations-each affecting the ideational, interpersonal, and textual meta functions of the image (Boeriis, 2024). Global tinting or exposure shifts recalibrate validity markers across the entire frame; local transmutations overwrite pixel values and alter represented bodies. Manipulation does not annihilate indexicality; it redistributes it. The photonic substrate remains a trace of signal, yet the analogical view becomes saturated with communicative intention.

Validity, measured through parameters such as color saturation, contextualization, illumination, and depth, functions as a scale of perceived realism. In naturalistic coding orientations, deviation from a photorealistic profile reduces perceived neutrality (Boeriis, 2024). In sensory or abstract orientations, such deviation amplifies aesthetic or conceptual emphasis. Trustworthiness, therefore, migrates from ontological grounding to negotiated



convention. Semiotic truth agreements are no longer anchored solely in contiguity but in genre-specific expectations.

Smartphone photography intensifies this transformation. The device operates as an extension of the sensory-motor apparatus, embedding manipulation into everyday communicative exchange (Boeriis, 2024). The selfie production model conceptualizes the act of photographing as a tripartite sequence-taking, editing, posting-where editing is constitutive rather than supplementary (Qutub, 2021). Post-production precedes circulation in habitual practice, dissolving the boundary between capture and transformation. Photography becomes a dialogical performance rather than a passive registration.

Visual literacy adapts accordingly. The development and validation of a visual literacy scale grounded in social semiotic theory indicate that competencies related to smartphone photography can be operationalized and measured, confirming that interpretive expertise now includes awareness of manipulation conventions (Kamalvand & Khany, 2024). Structured competencies mediate the evaluation of trust.

A third trajectory concerns the redistribution of semiotic agency in computational and institutional environments. The photonic image, understood as a quantized matrix of pixel values, supports machine reception independent of analogical perception (Voisard & Margot, 2024). In automated systems, interpretation occurs at the level of mathematical reception rather than human visual judgment. Facial recognition infrastructures demonstrate how biometric photography migrates from indicant to print, saturating referent determination through institutional convention (Marino, 2024). The enrolment phase produces a model functioning as reference material; recognition stages generate match scores that acquire evidentiary authority. The image here operates within a regime of designation governed by algorithmic thresholds.

Such systems reconfigure the relationship between trace and power. The display of facial recognition in public settings does not merely identify; it performs institutional authority through visual inscription (Marino, 2024). The image becomes infrastructural. Its indexicality underwrites enforcement rather than representation.

Anthropological analysis situates these transformations within broader semiotic ecologies. Images are treated as communicative events embedded in social practice rather than static representations (Nakassis, 2023). Photographic meaning emerges through uptake, circulation, and interaction. The image is neither an autonomous object nor a pure trace; it is a node in semiotic exchange.

The material substrate of photography itself undergoes interrogation. "Photography without pictures" foregrounds the procedural and infrastructural dimensions of photographic production (Baird, 2024). By displacing visual output, the practice exposes the apparatus as a semiotic agent. Absence becomes an analytic device. The photograph's signifying capacity persists even when visual content recedes, indicating that indexicality may be abstracted from visible representation.

Enumeration provides another structural mutation. Conceptual documentary photobooks operate through serial accumulation rather than singular attestation, converting the image into a list-like epistemic structure (Schürmann, 2022). Enumeration fragments unity, distributing meaning across the sequence. The individual trace yields to patterned aggregation.

Memory intersects with these shifts. The practice of "seeing photographically" situates photographic perception within a regime of mediated remembrance rather than direct witnessing (Frosh, 2024). The photograph conditions memory even before recollection; it

anticipates its own archival function. Temporal indexicality merges with anticipatory framing. Across these trajectories, a structural pattern emerges. The structural relations between semiotic layers are presented below (Figure 1).

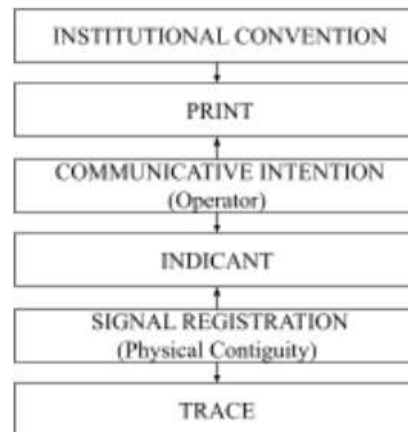


Figure 1. Hierarchical transformation of the photographic sign in contemporary culture (compiled by the author based on Voisard & Margot, 2024; Boeriis, 2024; Marino, 2024)

The image oscillates between three ontological positions: involuntary trace, communicative indicant, and conventionally stabilized print. Digital manipulation amplifies the indicant layer; biometric infrastructures consolidate the print layer; social circulation reactivates trace through reinterpretation. The distribution of semiotic dominance in contemporary photographic practices is illustrated below (Figure 2).

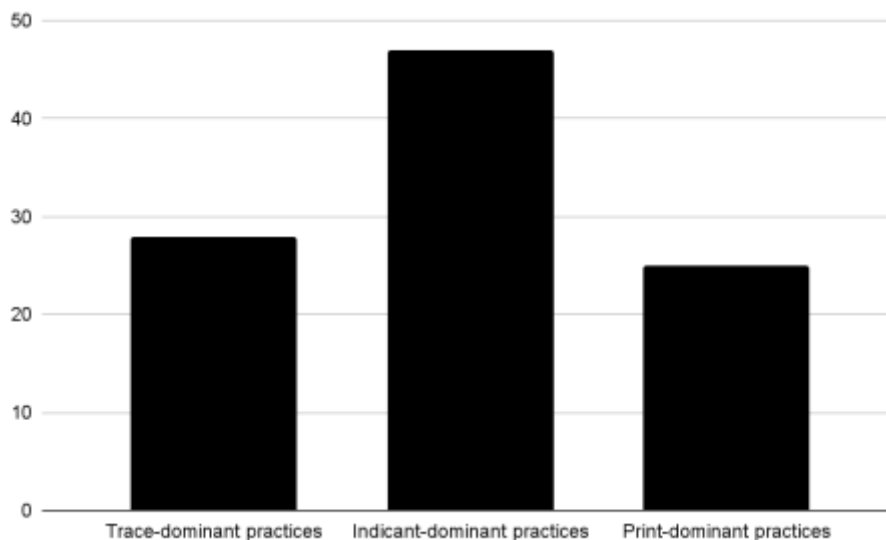


Figure 2. Relative prevalence of semiotic dominance in contemporary photographic environments (compiled by the author based on Voisard & Margot, 2024; Qutub, 2021; Marino, 2024)

None of these layers displaces the others entirely. They coexist, often in tension. The semiotics of modern photographic culture, therefore, operates through negotiated agreements linking signal-based contiguity, technological mediation, and institutional convention. The image attests, designates, performs, and circulates. It persists as a trace even when overwritten, as indicant even when automated, as a print even when replicated. The friction between these states defines their contemporary condition.



DISCUSSION

The analytical reconstruction undertaken above displaces the center of gravity in photographic semiotics. The image in contemporary culture cannot be adequately approached through resemblance alone, nor through manipulation alone. Its functioning unfolds through layered ontologies: trace, indicant, and print. Each layer persists, yet none retains exclusive authority. What becomes visible is not the disappearance of indexicality, but its redistribution across technological, communicative, and institutional regimes.

The configuration of the trace remains foundational. Photography originates in the recording of a signal emitted by a referent under conditions of physical contiguity and temporal simultaneity. That contiguity establishes a material anchoring that resists purely constructivist interpretations. Even when the analogical view is altered, the photonic substrate retains its status as a vestige of signal. Yet the trace no longer appears as a stable epistemic guarantee. Its evidentiary force depends increasingly on knowledge of genesis, on awareness of exposure conditions, metadata, algorithmic pre-processing, and post-production operations. The trace does not disappear; it becomes opaque.

This opacity marks a structural transformation. In analogue regimes, the ontological grounding of photography in physical registration functioned as a relatively transparent cultural assumption. Digital infrastructures introduce layers of mediation between signal and perception. Pixel quantization, compression algorithms, color management systems, and automated enhancements intervene before the image becomes available to human reception. The photonic image is processed before it is seen. The chain of contiguity persists, yet it is technologically modulated. The locus of semiotic analysis, therefore, shifts from the final visual artefact to the processual architecture that produces it.

Manipulation intensifies this displacement. Pixel-level operations-global modifications, local modifications, transmutations-alter validity markers and reconfigure the interpersonal relation between producer and viewer. Manipulation is not merely falsification; it is grammar. Exposure adjustments recalibrate brightness and depth, saturation alters sensory emphasis, and local transmutations reshape bodily proportions. These interventions operate within established coding orientations, and their semiotic impact depends on genre-specific conventions. An identical alteration may function as aesthetic amplification in one context and as deception in another.

The notion of semiotic truth agreement becomes central here. Trustworthiness no longer derives solely from indexical grounding but from alignment between representational claim and coding orientation. A documentary image that adopts heavy sensory stylization risks destabilizing its naturalistic validity. An advertising image that foregrounds aesthetic enhancement may maintain coherence within a sensory orientation. The instability does not arise from manipulation per se, but from misalignment between semiotic expectation and design choice. Trust shifts from ontology to convention.

At the same time, digital culture embeds manipulation into everyday communicative practice. The act of photographing is no longer separable from editing and posting. The production sequence integrates capture and transformation into a single gesture. This integration erodes the conceptual boundary between trace and indicant. Photography becomes overtly communicative from inception. The image is produced not only to register a signal, but to participate in exchange. Even automated surveillance systems operate within communicative architectures designed by institutional actors. The indicator layer expands.

Yet this expansion does not eliminate the trace; it overlays it. The tension between involuntary vestige and voluntary articulation persists as a structural friction. In biometric regimes, this friction is resolved through convention. Enrolment procedures stabilize images as reference material, transforming indicants into prints. The institutional



framework saturates referent determination. Recognition systems generate similarity scores that acquire normative authority. Here, thirdness prevails: the image functions within a conventional system that predefines interpretive outcomes.

Such regimes foreground the political dimension of photographic semiotics. When institutional conventions govern the transformation of the indicant into print, the image participates in power structures. Facial recognition infrastructures exemplify this shift. The photographic sign no longer merely attests; it enforces. The designation principle, originally tied to pointing and attestation, becomes embedded in automated identification. The image directs attention algorithmically. It is no longer only seen; it sees.

Another pressure emerges from temporality. Photographic time, structured through exposure and suspension, introduces a paradoxical relation between presence and absence. The image attests to "that-has-been," yet its circulation in digital networks extends its temporal reach indefinitely. Replication detaches the image from its original spatio-temporal context. The unity of exposure contrasts with the multiplicity of dissemination. Each copy remains numerically identical at the level of data, yet functionally distinct within new interpretive frames. Individuality persists technically; semantically, it disperses.

This dispersion is amplified by enumeration and seriality. Conceptual documentary practices aggregate images into lists, transforming singular attestation into patterned accumulation. Meaning emerges through repetition rather than through isolated reference. The index becomes statistical rather than singular. The semiotic weight of each image diminishes as the structural pattern gains prominence. Enumeration destabilizes the principle of unity by distributing coherence across the sequence.

Memory introduces a further complication. The photograph does not simply preserve; it pre-structures recollection. Seeing photographically becomes a habit that shapes perception prior to capture. Anticipatory framing influences what is recorded. The trace is conditioned by expectation. In this sense, the genesis of the trace is not purely mechanical; it is culturally inflected. The operator's horizon of anticipation shapes the moment of exposure. The involuntary remnant is always embedded in voluntary orientation.

These intersecting dynamics challenge any residual dichotomy between authenticity and fabrication. The image is neither pure trace nor pure construction. It is a stratified artefact in which automatic signal registration, technological mediation, communicative intention, and institutional convention coexist. Attempts to reduce photographic semiotics to one of these dimensions obscure the structural complexity revealed by contemporary practice.

The trichotomy of trace, indicant, and print proves analytically productive precisely because it refuses simplification. Trace foregrounds physical contiguity and involuntary genesis. Indicant foregrounds communicative intention and design. Print foregrounds the convention and saturation of referent determination. Modern photographic culture oscillates among these modes. A single image may function as a trace in one interpretive frame, as an indicant in another, and as a print within institutional contexts.

No stable hierarchy governs these transitions. Instead, friction persists. The trace resists total conventionalization; the indicant resists total automation; the print resists total interpretive openness. Each category asserts a different claim about the relation between image and referent. Contemporary culture stages these claims simultaneously.

The semiotics of the image in modern photographic culture, therefore, unfolds as a negotiation among ontological grounding, technological modulation, communicative articulation, and institutional codification. The photograph remains a signal-based remnant of presence, yet it operates within expanded infrastructures of circulation and control. Its



evidentiary authority is neither guaranteed nor dissolved; it is recalibrated within layered regimes of interpretation.

Meaning does not settle at a single point. It disperses across process, artefact, and institution. The photograph continues to say “there,” yet what that pointing accomplishes depends on who stages it, how it is processed, and within which context it is received. The semiotic tension between vestige and articulation persists, structuring the evolving grammar of photographic culture.

CONCLUSION

The first task - clarification of the ontological grounding of the photographic sign - has demonstrated that trace remains foundational in contemporary photography, rooted in signal-based physical contiguity. However, its evidentiary transparency is increasingly mediated by technological processes.

The second task - analysis of digital manipulation and smartphone photography - has revealed that manipulation functions as grammar rather than mere falsification. The indicative layer expands through communicative articulation and embedded editing practices, reshaping conventions of validity and realism.

The third task - examination of institutional regimes - has shown that biometric infrastructures stabilize photographic signs as prints through conventional and regulatory saturation. Institutional frameworks redefine photographic designation as algorithmic enforcement.

The study concludes that modern photographic culture operates through the coexistence and friction of trace, indicant, and print. None of these layers displaces the others; instead, their dynamic interaction structures contemporary visual meaning. Photography remains a signal-based remnant of presence, yet its authority emerges from negotiated semiotic configurations shaped by technology, communication, and institutional codification.

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