

REVIEW ARTICLE

Cultural heritage, visual communication and legal protection: Graphic patterns based on the Manteña-Huancavilca culture

Patrimonio cultural, comunicación visual y protección jurídica: patrones gráficos basados en la cultura Manteña-Huancavilca

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Abstract This study analyzes the creation of graphic compositional variants inspired by Pre-Columbian visual heritage, focusing on the formal and symbolic elements identified in three archaeological artifacts from the Manteña-Huancavilca culture and on the legal considerations associated with their contemporary reinterpretation. The objective was to document and systematize a graphic design process based on the extraction, transformation, and recombination of selected visual elements, while examining the need to recognize cultural origin and safeguard heritage significance. A qualitative visual-analysis approach was used, supported by technical recording and an analysis sheet, together with a complementary normative review of the Constitution of Ecuador and the UNESCO Convention for the Safeguarding of the Intangible Cultural Heritage. The study generated ten preliminary compositional variants and selected four representative patterns for detailed presentation because of their visual coherence, formal balance, and suitability for contemporary applications. The selected patterns illustrate the use of past experience, simplicity, continuity, similarity, and symmetry. The findings show that contemporary graphic reinterpretation can contribute to heritage dissemination when it preserves provenance, symbolic context, and culturally responsible use, linking visual communication with legal and ethical safeguards for cultural heritage.

Keywords Cultural heritage; legal protection; visual communication; Manteña-Huancavilca culture; graphic design

Resumen Este estudio analiza la creación de variantes compositivas gráficas inspiradas en el patrimonio visual precolombino, centrándose en los elementos formales y simbólicos identificados en tres piezas arqueológicas de la cultura Manteña-Huancavilca y en las consideraciones jurídicas asociadas con su reinterpretación contemporánea. El objetivo fue documentar y sistematizar un proceso de diseño gráfico basado en la extracción, transformación y recombinación de elementos visuales seleccionados, examinando a la vez la necesidad de reconocer el origen cultural y salvaguardar su significado patrimonial. Se empleó un enfoque cualitativo de análisis visual, apoyado en el registro técnico y en una ficha de análisis, junto con una revisión normativa complementaria de la Constitución del Ecuador y de la Convención de la UNESCO para la Salvaguardia del Patrimonio Cultural Inmaterial. Se generaron diez variantes compositivas preliminares y se seleccionaron cuatro patrones representativos por su coherencia visual, equilibrio formal y adecuación a aplicaciones contemporáneas. Los patrones ilustran el uso de los principios de experiencia previa, simplicidad, continuidad, semejanza y simetría. Los resultados muestran que la reinterpretación gráfica contemporánea puede contribuir a la difusión patrimonial cuando preserva la procedencia, el contexto simbólico y un uso culturalmente responsable, vinculando la comunicación visual con salvaguardias jurídicas y éticas del patrimonio cultural.

Palabras clave Patrimonio cultural; protección jurídica; comunicación visual; cultura Manteña-Huancavilca; diseño gráfico

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Introduction

The Pre-Columbian cultures of coastal Ecuador constitute a major source of archaeological, visual, and symbolic heritage. Recent research on Manteño-Huancavilca graphic identity in Portoviejo demonstrates the persistence of geometric and iconographic structures that can inform contemporary design while maintaining links with local cultural memory (Andraus Quintero & Indarte Farfán, 2023). Archaeological research on coastal Ecuador likewise emphasizes the value of material culture for reconstructing social organization and symbolic practices (Prümers et al., 2023).

Contemporary studies in Ecuador reinforce the relevance of ancestral iconography as a vehicle of identity. Ruiz-Ruiz et al. (2022) show that visual identity derived from archaeological symbols can contribute to the re-evaluation and communication of cultural heritage, while Pinto et al. (2024) demonstrate that participatory pictogram systems can support Indigenous community communication and the reactivation of situated knowledge. These studies suggest that graphic reinterpretation is most defensible when it is connected to cultural context, community meaning, and transparent acknowledgment of origin.

The relationship between graphic design and heritage interpretation has also received renewed attention internationally. Harland et al. (2024) identify graphic heritage as a tool for interpreting UNESCO-designated heritage and for linking design practice with heritage management. Goud and Lombardo (2022) similarly emphasize communication features that facilitate appreciation of cultural heritage values, while Liu et al. (2024) show how visualization strategies can contribute to the preservation and transmission of cultural information. Together, these approaches support the use of design as a mediated form of heritage interpretation rather than as mere decorative reproduction.

Research involving Indigenous cultural objects and design practices further highlights the importance of context and cultural agency. Cameron (2024) shows that creative inquiry can recover spiritual and cultural dimensions embedded in historical objects. St John (2022a) demonstrates that communication design in Indigenous settings is intertwined with place, identity, storytelling, and intergenerational knowledge, whereas St John (2022b) shows that design-based enterprise can create contemporary applications while remaining grounded in community values and cultural continuity.

This cultural dimension has legal implications. Oruç (2022) notes that documenting and adapting Indigenous traditions raise questions about copyright, control, and the relationship between safeguarding and subsequent creative works. Musiza (2022) likewise examines traditional cultural expressions through the lens of intellectual property and community governance, showing that legal protection must be assessed alongside customary values and the interests of source communities. At the international level, the WIPO Treaty adopted in 2024 strengthens recognition of Indigenous Peoples and local communities within the evolving relationship

between intellectual property and traditional knowledge (World Intellectual Property Organization [WIPO], 2024).

In Ecuador, this discussion is also framed by constitutional protection of cultural identity, access to heritage, and the moral and patrimonial rights associated with artistic creation (Constitution of the Republic of Ecuador, 2008). The UNESCO Convention for the Safeguarding of the Intangible Cultural Heritage defines safeguarding broadly through identification, documentation, protection, promotion, enhancement, and transmission (UNESCO, 2003). Although these instruments do not automatically confer exclusive rights over every archaeological motif, they provide a normative basis for responsible attribution, cultural contextualization, and heritage-sensitive reuse.

The formal organization of the proposed graphic patterns was supported by contemporary research on perceptual organization. Pinna et al. (2022) revisit the complexity of similarity in Gestalt grouping, while Van Geert and Wagemans (2024) synthesize the broader principle of Prägnanz and the role of grouping principles such as proximity, similarity, and good continuation. In design education, Núñez-Pacheco (2022) demonstrates the continued applicability of Gestalt laws to creative practice, and Hu (2024) provides experimental evidence on the use of the Gestalt closure principle in visual design.

Current design research also supports interdisciplinary approaches to heritage. Bosco et al. (2024) show how narrative and interactive exhibition design can enhance local cultural heritage, while Xia et al. (2024) propose an interdisciplinary design framework for intangible cultural heritage that evaluates cultural fit alongside creativity, aesthetics, experience, and diversity. These perspectives reinforce the need to evaluate heritage-inspired design not only through formal coherence but also through cultural appropriateness and communicative value.

Against this background, the present study examines selected graphic elements from archaeological artifacts associated with the Manteña-Huancavilca culture and explores how they can be recombined into contemporary visual patterns. The proposal is conceived as a design and heritage-interpretation exercise rather than as an assertion of ownership over the original cultural expressions.

The legal component therefore focuses on principles of cultural recognition, attribution, safeguarding, and responsible reuse. It does not seek to establish that the selected motifs are subject to a specific exclusive intellectual-property right; rather, it identifies safeguards that should accompany their contemporary reinterpretation in order to reduce decontextualization and acknowledge their cultural provenance (Oruç, 2022; Musiza, 2022; WIPO, 2024).

Accordingly, this study aims to analyze graphic elements present in selected archaeological artifacts of the Manteña-Huancavilca culture, develop contemporary compositional variants through Gestalt-based organization, and discuss the cultural and legal considerations that should accompany their application to present-day graphic products.

Methodology

This study conducted a formal and graphic analysis of three archaeological artifacts associated with the Manteña-Huancavilca Pre-Columbian culture. The methodological approach was based on identifying, extracting, and reinterpreting significant graphic elements from each selected piece, which served as the basis for the development of new visual compositions. The three pieces were treated as a purposive sample because the material available in the manuscript presented clearly legible ornamental motifs and variation in artifact type, allowing comparison across distinct visual configurations. The analysis was guided by Gestalt principles relevant to visual organization and contemporary design.

Ten preliminary compositional variants were generated from combinations and transformations of the extracted graphic elements. From these, four representative patterns were selected for detailed presentation based on visual coherence, formal balance, and suitability for contemporary applications. The analysis of the selected patterns focused on past experience, simplicity, continuity, similarity, and symmetry, drawing on current Gestalt research and design applications (Pinna et al., 2022; Núñez-Pacheco, 2022; Van Geert & Wagemans, 2024).

A specific analysis sheet was used to organize the visual examination of the three artifacts. The sheet recorded the

artifact identifier, visible motif, extracted visual element, relevant formal characteristics, transformation or recombination process, Gestalt principle applied, and proposed contemporary application. This procedure provided a consistent basis for comparing the extracted elements and documenting the transition from archaeological reference to new graphic pattern.

As a complementary legal component, a focused normative and doctrinal review was conducted to identify principles relevant to contemporary reuse of cultural expressions. The analysis considered Ecuadorian constitutional protection of cultural identity and artistic creation, UNESCO safeguarding principles, recent scholarship on Indigenous cultural expressions and copyright, and the 2024 WIPO Treaty concerning intellectual property, genetic resources, and associated traditional knowledge (Constitution of the Republic of Ecuador, 2008; UNESCO, 2003; Oruç, 2022; Musiza, 2022; WIPO, 2024). This component was interpretive and did not attempt to classify the selected motifs as individually protected intellectual-property subject matter.

Finally, the four selected graphic patterns were transferred to visual mockups as an exploratory application in contemporary design practice, including textile, ceramic, printed, and spatial contexts. These mockups were used to illustrate possible applications rather than to measure user acceptance, commercial viability, or cultural impact.

Table 1

Archaeological pieces

Number	1	2	3
Title of the piece	Vessel (P1)	Seated figure (P2)	Supreme chief (P3)
Photo			

The three archaeological artifacts are presented together with the graphic elements extracted from each image. Source: images supplied by the authors in the original manuscript.

Results and discussion

Systematic visual observation of the three archaeological artifacts enabled the identification of recurrent geometric and ornamental elements that were subsequently extracted, simplified, or recombined. The results are presented together with their interpretation in relation to the Gestalt principles used and to the literature on Manteña-Huancavilca visual heritage.

Table 2

Archaeological pieces and visual elements

Archaeological pieces	Extracted visual elements
P1 	E5, E6, E7, E8 
P2 	E3 y E4 
P3 	E1 y E2 

From these extracted elements, ten preliminary compositional variants were generated. Four representative patterns were selected for detailed presentation and discussion below because they most clearly illustrated the design procedures and Gestalt principles applied.

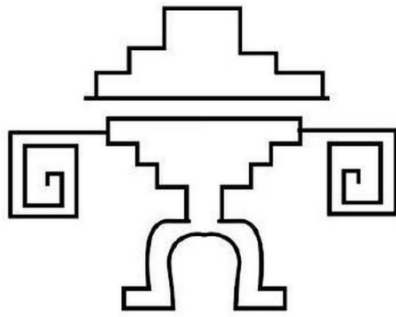


Figure 1
Pattern 1: Graphic Element Combination E1-E4-E8

In Pattern 1, past experience guided the organization of elements E1, E4, and E8 into a configuration that can be perceived as humanoid. This illustrates how perceptual organization depends not only on isolated parts but also on the tendency to seek coherent configurations, a principle consistent with contemporary Gestalt research (Van Geert & Wagemans, 2024).

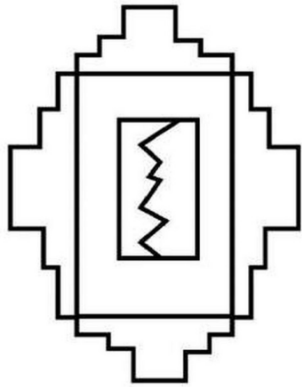


Figure 2
Pattern 2: Graphic Element Combination E7-E8

In Pattern 2, the principle of simplicity was applied by reducing the extracted elements to a clear geometric arrangement. The visual economy of the composition is consistent with the Gestalt tendency toward organized and stable perceptual structures (Van Geert & Wagemans, 2024; Núñez-Pacheco, 2022).

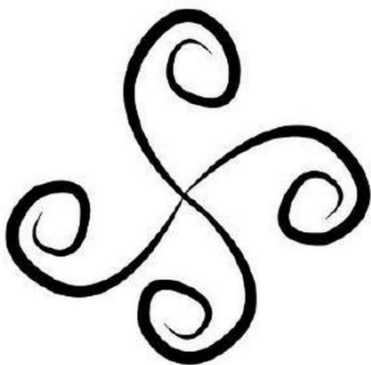


Figure 3
Pattern 3: Graphic Element Variation E6

In Pattern 3, continuity and similarity were applied in combination. Element E6 was simplified and repeated in a spiral-based configuration, producing directional flow and visual grouping. Recent research confirms that similarity remains a central, although complex, mechanism of perceptual organization (Pinna et al., 2022).

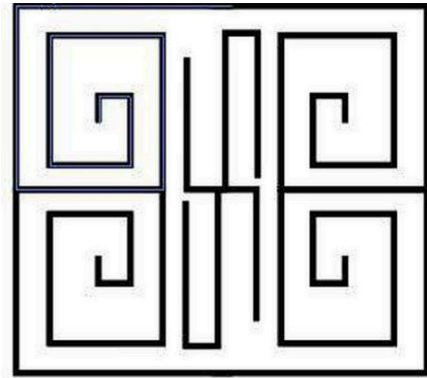


Figure 4
Pattern 4: Graphic Element Combination E1-E3-E4

In Pattern 4, symmetry was used to organize elements E1, E3, and E4 around a balanced central structure. The composition illustrates how repeated and related forms can support perceptual unity, while contemporary experimental design research continues to evaluate the conditions under which Gestalt grouping and completion operate (Hu, 2024; Van Geert & Wagemans, 2024).

Graphic patterns applied to selected products

The graphic patterns obtained from the archaeological analysis were transferred to selected contemporary products as exploratory mockups. This approach is consistent with recent work that treats visual design as a means of heritage interpretation and cultural communication rather than as simple ornamentation (Harland et al., 2024; Goud & Lombardo, 2022; Liu et al., 2024). The mockups therefore function as demonstrations of possible application, not as evidence of commercial acceptance or community endorsement.

Accordingly, the mockups should be understood as design demonstrations rather than evidence of commercial viability, user preference, or cultural acceptance. Their value in this study lies in showing the adaptability of the selected patterns across different contemporary media.



Figure 5
Mockup of Graphic Pattern 1 on a trucker cap featuring elements from the Manteña-Huancavilca culture

In Pattern 1, the resulting graphic design was applied to a trucker cap, incorporating elements extracted from the selected archaeological references. The mockup demonstrates how the pattern can be transferred to a

contemporary textile surface while retaining a visible connection to its formal source.



Figure 6

Mockup of Graphic Pattern 2 applied to a high-top sneaker, incorporating geometric motifs from the Manteña-Huancavilca Pre-Columbian culture

In Graphic Pattern 2, the design was adapted to a high-top sneaker. The extracted geometric motifs were distributed across visible areas of the product to demonstrate how the pattern could operate on a three-dimensional contemporary object. The mockup is illustrative and does not constitute an assessment of functionality, consumer preference, or market viability.



Figure 7

Mockup of Graphic Pattern 3 applied as an interior wall covering, featuring spiral motifs from the Manteña-Huancavilca Pre-Columbian culture

In Graphic Pattern 3, the design was applied as an interior wall covering using a repetitive system that emphasizes continuity and flow. The spiral forms create an impression of movement, while repetition and spacing demonstrate how the motif can be extended across a larger surface without changing its basic formal structure.



Figure 8

Mockup of Graphic Pattern 4 applied to a ceramic mug, incorporating geometric motifs from the Manteña-Huancavilca Pre-Columbian culture.

In Graphic Pattern 4, the design was applied to a ceramic mug as an exploratory cultural-design proposal. The motif combines straight lines and spiral-derived forms in a symmetrical square structure. The application illustrates the adaptability of the pattern to a utilitarian object while maintaining a visible relationship with the visual references used in its development.

Taken together, the four selected patterns show that archaeological visual elements can be simplified, recombined, and adapted to contemporary graphic structures without directly copying the original artifacts. This result is consistent with Ecuadorian research showing that ancestral iconography can support visual identity and cultural re-evaluation (Ruiz-Ruiz et al., 2022) and with the Manteña-Huancavilca case examined by Andraus Quintero and Indarte Farfán (2023), where pre-Columbian graphic codes were incorporated into urban design.

The design process also demonstrates the practical relevance of Gestalt principles for organizing extracted motifs. Similarity, continuity, symmetry, simplicity, and configurational coherence provided a systematic basis for the four selected patterns (Pinna et al., 2022; Núñez-Pacheco, 2022; Van Geert & Wagemans, 2024). However, the present study did not experimentally test viewer responses; future work could adopt perceptual methods such as those used by Hu (2024) to evaluate whether intended groupings are consistently recognized.

The findings also align with contemporary Indigenous and community-centered design research. St John (2022a, 2022b) shows that visual communication and design enterprise can support storytelling, identity, and cultural continuity when they remain grounded in community relationships. Pinto et al. (2024) likewise demonstrate that pictograms can operate as collaborative devices for Indigenous community communication, while Cameron (2024) underscores the need to attend to the cultural and spiritual content of historical objects during creative interpretation.

From a heritage-management perspective, the patterns should therefore be understood as interpretive devices whose value depends on how clearly they communicate provenance and context. Harland et al. (2024) emphasize the role of graphic heritage in interpretation, and Bosco et al. (2024) show how design can enhance local heritage through narrative and interactive strategies. Xia et al. (2024) further suggest that cultural fit should be treated as an explicit criterion in heritage-oriented design, alongside creativity and aesthetics.

The legal analysis reinforces this caution. Contemporary adaptations of culturally rooted expressions may generate new copyrightable outputs while still raising questions about control, attribution, community interests, and cultural integrity (Oruç, 2022). Musiza (2022) demonstrates that legal protection of traditional cultural expressions is most effective when formal intellectual-property mechanisms are considered together with customary values and community governance.

At the normative level, Ecuadorian constitutional principles protect cultural identity, access to heritage, and rights associated with artistic creation, while UNESCO safeguarding principles emphasize identification, documentation, protection, promotion, enhancement, and transmission (Constitution of the Republic of Ecuador, 2008; UNESCO, 2003). The 2024 WIPO Treaty does not directly create a general exclusive right over traditional cultural expressions, but its recognition of Indigenous Peoples and local communities within international intellectual-property governance illustrates the broader

movement toward stronger consideration of traditional knowledge and cultural interests (WIPO, 2024).

For this reason, the use of Manteña-Huancavilca-inspired motifs in contemporary products should include, at minimum, transparent acknowledgment of cultural origin, avoidance of misleading claims of authorship over ancestral expressions, preservation of contextual

Conclusions

The study analyzed graphic elements from three archaeological artifacts associated with the Manteña-Huancavilca culture and used them to develop contemporary graphic patterns. Ten preliminary variants were generated, from which four representative patterns were selected for detailed presentation. The results show that extracted motifs can be simplified and recombined through Gestalt-based design procedures to produce visually coherent contemporary compositions.

The four patterns illustrate the application of past experience, simplicity, continuity, similarity, and symmetry. Their transfer to mockups demonstrates design adaptability across textile, ceramic, printed, and spatial contexts; however, the study did not measure aesthetic preference, commercial viability, community acceptance, or cultural impact. Accordingly, the applications should be understood as exploratory design proposals rather than evidence of strengthened cultural identity or user recognition.

From a legal perspective, the study suggests that contemporary graphic reinterpretation should be accompanied by safeguards aimed at recognizing cultural origin, preserving symbolic context, and avoiding misleading appropriation of ancestral expressions. The relevant legal framework is not limited to copyright: it also includes constitutional cultural rights, heritage safeguarding, community interests, and the evolving international treatment of traditional knowledge (Oruç, 2022; Musiza, 2022; WIPO, 2024).

The main limitations concern the small purposive sample of three artifacts, the documentary nature of the visual material, the absence of empirical validation with users or heritage specialists, and the interpretive subjectivity inherent in applying Gestalt principles to graphic design. Future studies should expand the archaeological sample, document the provenance of visual sources in greater detail, incorporate expert or community validation, and compare the proposed patterns with those derived from other Pre-Columbian visual traditions.

Future research should expand the archaeological sample and incorporate community participation, expert heritage review, and empirical testing of visual reception. It should also evaluate cultural fit and interpretive effectiveness using criteria consistent with recent heritage-design research (Harland et al., 2024; Xia et al., 2024), while assessing the legal and ethical implications of commercial applications before broader dissemination.

Overall, the study supports the use of contemporary graphic design as a means of interpreting and communicating archaeological visual heritage. Its contribution lies in documenting a reproducible design process that connects visual analysis, Gestalt-based composition, and contemporary application while

information where feasible, and consultation with relevant heritage institutions or communities when uses become extensive, commercial, or culturally sensitive. These safeguards are compatible with recent scholarship that treats design as a culturally situated process rather than a neutral extraction of visual forms (St John, 2022a; Pinto et al., 2024; Cameron, 2024).

maintaining an explicit commitment to responsible heritage representation.

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Conflicts of interest

The authors declare that they have no conflicts of interest.

Author contributions

Brian Santana-Soledispa and Rauny J. Limonta-Más: Conceptualization, data curation, formal analysis, investigation, methodology, validation, visualization, drafting the original manuscript, and writing, review, and editing.

Data availability statement

The materials and data used and/or analyzed during the current study are available from the authors on reasonable request.

Statement on the use of AI

The authors acknowledge the use of generative AI and AI-assisted technologies to improve the readability and clarity of the article. The authors reviewed and edited the final content and assume full responsibility for the published work.

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