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VISUAL STRUCTURE ANALYSIS OF BALINESE *KEKETUSAN BATUN TIMUN* AS A BASIS FOR GEOMETRIC TRANSFORMATION IN CONTEMPORARY VISUAL COMMUNICATION DESIGN

By:

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Abstract

This study examines the visual structure of Balinese *Keketusan Batun Timun* ornamentation to formulate conceptual considerations for geometric transformation in contemporary visual communication design. A descriptive-analytical qualitative approach was employed through formal visual analysis of a single researcher-produced redrawing of an established traditional motif. The analysis focused on morphological characteristics, compositional and spatial relationships, and tonal surface treatment. The findings identified four elongated primary forms arranged into two paired configurations with opposing diagonal orientations, accompanied by supplementary ornamental elements and horizontal repetition. Positive-negative space relationships and layered shading further contribute to the composition's spatial organization, apparent volume, and visual emphasis. These findings were synthesized into three interrelated categories of transformation considerations: morphological characteristics, compositional relationships, and surface qualities. A synthesis matrix linked observable features to possible design modifications and formal consequences requiring examination. Three illustrative alternatives, comprising contour-based representation, tonal simplification, and modular repetition, were compared qualitatively to identify visible differences in surface appearance and compositional organization. The resulting framework provides a case-specific analytical basis for considering graphic adaptation rather than a standardized or validated geometric transformation method. The study is limited to one redrawn representation and does not establish motif recognizability, cultural interpretation, or communication effectiveness following modification.

Keywords: *Keketusan Batun Timun*; Visual Structure; Balinese Ornamentation; Geometric Transformation; Visual Communication Design.

INTRODUCTION

Traditional Balinese ornamentation represents a visual practice in which stylized forms, compositional arrangements, and decorative conventions are integrated into architectural and artistic contexts. Its visual organization reflects relationships among motif elements, repetition, and spatial arrangement that can be examined through formal analysis. Suparta et al. (2023)

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discuss the forms and functions of Balinese ornaments, including *keketusan*, *pepatran*, and *kekarangan*, and emphasize their continued development across artistic and architectural applications. These ornamental categories provide a contextual basis for examining how traditional motifs are organized and how their formal characteristics may inform subsequent design interpretation. Artha and Nuriarta (2019) further distinguish ornamental motifs from the repeated patterns developed from them in their study of Balinese gamelan ornamentation. Utami and Swari (2021) document the application of traditional Balinese ornaments within the interior of the Ksirarnawa building, providing an additional architectural context for examining ornamental forms and their placement.

Among the *keketusan* motifs, *Batun Timun* is characterized by stylized forms resembling cucumber seeds. Mahadi et al. (2022) specifically describe *Keketusan Batun Timun* as a stylization of cucumber seeds combined with additional ornamental forms. This documentation supports the traditional ornamental context of the motif, although it does not establish the precise classification of every supplementary element in the researcher-produced redrawing. The representation selected for this study contains four elongated primary forms with curved contours and pointed ends, organized into two pairs with opposing diagonal orientations. These paired configurations recur horizontally and are accompanied by supplementary ornamental elements occupying the intervening spaces. The illustration also incorporates layered shading, tonal contrast, and distinct relationships between positive and negative spaces. Consequently, its visual organization cannot be adequately described through the morphology of individual motifs alone. The relationships among primary forms, supplementary elements, spatial intervals, repetition, and surface treatment constitute interconnected aspects of the selected composition.

Previous research has established important approaches to the formal and geometric analysis of Balinese ornamentation. Pebryani and Kleiss (2017) examined four *keketusan* motifs using symmetry analysis and *shape grammar*, classifying *Batun Timun* within the one-dimensional symmetry group pm11, characterized by vertical reflection and translation. Their study further demonstrated how ornamental patterns could be examined through the identification of initial shapes and spatial relationships or generative rules. Extending this line of inquiry, Pebryani and Kleiss (2018) investigated the use of symmetry group and induced group theories to generate new pattern configurations from existing design units. These contributions establish that motif identification, symmetry classification, modular repetition, and rule-based pattern generation are already recognized approaches within ornamental design research. Accordingly, the present study does not claim novelty in identifying the geometric principles of *Batun Timun* or introducing a new generative transformation procedure.

Recent studies beyond the Balinese context have also advanced the computational transformation of traditional decorative patterns. Ding et al. (2020) developed an improved *shape grammar* approach combined with optimization techniques for the reuse of traditional Miao batik patterns. More recently, Xiong and Wang (2025) compared rule-based *shape grammar* and diffusion-based generative methods in the development of traditional Baoxiang patterns, examining differences in structural preservation and design variation. Wu et al. (2023) developed a shape-grammar-based workflow for extracting and adapting traditional cement-tile patterns into product designs. Similarly, Bohao et al. (2024) applied shape grammar to the transformation of Fuyang paper-cutting patterns for contemporary cultural and creative products. These studies provide additional examples of design-oriented pattern transformation, although their generative procedures differ from the qualitative interpretive approach adopted

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here. These studies demonstrate the increasing methodological sophistication of traditional pattern transformation, particularly through rule-based and computational procedures. Nevertheless, their approaches differ from the present investigation, which does not generate or experimentally evaluate alternative motifs. Instead, this study examines the formal relationships within a single *Batun Timun* representation as a basis for identifying considerations that may precede geometric transformation.

Within the studies considered, the relationships among supplementary ornamental elements, negative-space configurations, and tonal treatment have received less explicit attention as interconnected considerations for modifying a particular visual representation. Symmetry classification can describe recurring geometric relationships, but it does not, by itself, determine how reducing an ornamental detail might alter adjacent negative spaces or how simplifying tonal layers might affect the apparent volume and visual emphasis of a motif. Similarly, identifying an initial shape does not fully account for the compositional role of supplementary elements surrounding the principal forms. These issues establish a specific analytical problem: how observable morphological, compositional, and surface characteristics can be examined together to identify possible consequences of visual modification. The present study addresses this problem through an integrated reading of the selected *Batun Timun* representation rather than through a new symmetry classification or an alternative pattern-generation algorithm.

This analytical focus has implications for contemporary visual communication design, where traditional ornamental forms may be considered for adaptation into graphic elements, repeated patterns, or other visual compositions. Kress and Van Leeuwen (2020) examine composition as a central dimension of visual design, providing a broader theoretical context for considering how the arrangement of elements contributes to the organization of visual representations. Such adaptation may involve contour simplification, proportional adjustment, reorganization of motif relationships, or reduction of surface detail. However, these operations cannot be assumed to preserve the original composition's distinctive visual characteristics. In the selected *Batun Timun* representation, modifying a primary contour may alter its relationship with surrounding negative spaces, changing the arrangement of repeated units may affect the position of supplementary elements, and reducing tonal detail may influence the perception of volume and visual prominence. For this reason, geometric transformation is understood here as a conceptual design consideration informed by formal visual evidence. The study organizes these considerations into three interrelated categories: morphological characteristics, compositional relationships, and surface qualities. Illustrative transformation alternatives are used to clarify possible design directions, but they are not presented as outcomes of a validated transformation method or as evidence of successful communication design.

Against this background, the study addresses two research questions: (1) How do the morphological characteristics of primary forms, supplementary ornamental elements, repetition, positive and negative spaces, and tonal treatment interact to constitute the visual structure of the selected *Batun Timun* representation? (2) How can these relationships inform a conceptual framework of considerations for geometric transformation in contemporary visual communication design? The study aims to identify the formal organization of a single *Batun Timun* representation and synthesize its observable characteristics into a matrix relating visual evidence, potential design modifications, and consequences requiring further examination. Its contribution lies in making these relationships explicit as a preliminary analytical basis for design development. The findings are limited to the selected representation and do not establish

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universal transformation rules, cultural recognition of modified motifs, or the effectiveness of proposed applications across communication media.

METHODOLOGY

This study employed a descriptive-analytical qualitative approach using formal visual analysis to examine the morphological, compositional, spatial, and tonal characteristics of Balinese *Keketusan Batun Timun* ornamentation. The approach focused on identifying the constituent visual elements of a selected representation, examining their structural relationships, and developing conceptual considerations for geometric transformation in contemporary visual communication design. The analysis distinguished observable visual characteristics from interpretations concerning their possible implications for design modification. The study did not seek to establish a new geometric transformation algorithm, verify mathematical symmetry, or evaluate the effectiveness of transformed ornamental forms.

The primary visual material consisted of a researcher-produced monochromatic redrawing of an established *Keketusan Batun Timun* motif. The researcher reproduced an existing traditional ornamental configuration rather than developing a new motif or intentionally modifying its principal composition. The drawing was produced and documented by the researcher, while the traditional motif itself was not claimed as an original creation. Its ornamental context was informed by published studies of Balinese ornamentation, particularly Suparta et al. (2023) and Pebryani and Kleiss (2017). The researcher-produced drawing served as the visual source for the present analysis and is presented in Figure 1 in the Results and Discussion section. The study distinguished the authorship of this redrawing from the historical authorship and wider cultural development of the traditional ornamental motif.

The representation was selected as a single visual case because it contains the formal characteristics required to examine several aspects of ornamental organization within the same composition. These characteristics include elongated primary forms, paired arrangements, supplementary ornamental elements, horizontal repetition, relationships between positive and negative spaces, and layered tonal treatment. Their coexistence within one visual field allowed the investigation to consider the relationships among morphology, composition, spatial organization, and surface qualities without combining different ornamental variants. The analysis was limited to this selected representation and was not intended to establish its representativeness across the full range of historical or contemporary *Keketusan Batun Timun* variations.

The study used the researcher-produced drawing as its primary visual material and relevant scholarly publications as contextual and methodological references. Rose (2023) informed the qualitative examination of visual materials and the distinction between observable characteristics and interpretive claims. Suparta et al. (2023) provided contextual information concerning Balinese ornamental forms and their applications. Pebryani and Kleiss (2017) provided a comparative basis for understanding initial shapes, symmetry classifications, and spatial relationships in *Keketusan* ornamentation, including *Batun Timun*. The findings of these publications were used to contextualize the analysis rather than to substitute for direct examination of the selected drawing. In particular, previously reported symmetry classifications were not assumed to have been mathematically verified in the present representation.

The analytical procedure comprised four interrelated operations. The first involved morphological identification of the primary and supplementary ornamental forms. This

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examination considered contour characteristics, relative size, orientation, internal details, and the spatial positions of individual elements. The purpose was to establish a descriptive basis for distinguishing the constituent forms and their roles within the composition. These observations provided the foundation for subsequent analysis of relationships among elements without assigning unverified symbolic meanings to their shapes.

The second operation examined compositional and geometric relationships, including the orientation of individual forms, their paired organization, horizontal repetition, and spatial relationships between adjacent units. The analysis distinguished the individual ornamental element, the paired configuration, and the repeated arrangement as different levels of compositional organization. Principles of repetition and apparent bilateral balance were used as descriptive categories, with reference to the geometric studies of Pebryani and Kleiss (2017). However, formal visual observation was not treated as equivalent to numerical measurement of contour geometry, angular relationships, proportional equality, or mathematical symmetry.

The third operation examined positive-negative space relationships and tonal treatment. The spatial analysis distinguished areas occupied by the primary and supplementary ornamental forms from the background spaces defined by their contours. Particular attention was given to how the boundaries of adjacent elements shaped the intervening spaces and contributed to the visual organization of the composition. Tonal analysis examined the distribution of light and dark values, the arrangement of layered shading, and their relationships with contour definition and the appearance of volume. The analysis also considered differences in apparent visual emphasis associated with relative size, contour complexity, and tonal contrast. Tonal distinctions were interpreted descriptively rather than measured using calibrated luminance values, and apparent visual emphasis was not treated as evidence of experimentally established viewer attention.

The fourth operation consisted of an analytical synthesis intended to connect the preceding visual observations with conceptual considerations for geometric transformation. The synthesis organized the identified characteristics into three interrelated categories: morphological characteristics, compositional relationships, and surface qualities. These categories were derived from the corresponding objects of analysis: the contours and configurations of individual forms, the spatial relationships among ornamental elements, and the tonal characteristics of their visual presentation. The synthesis did not treat these categories as independent or hierarchically ordered components, since changes to one aspect could have implications for the others.

The conceptual considerations were formulated by relating each observable characteristic to a possible design modification and identifying the visual consequences that would require subsequent examination. Preservation considerations concerned characteristics relevant to the recognizable form and compositional organization of the selected representation, without establishing empirically which characteristics were essential for motif recognition. Simplification considerations concerned possible reductions in contour complexity, ornamental detail, or tonal layering. Reorganization considerations concerned possible changes to the arrangement, spacing, proportion, or repetition of visual elements. Each proposed modification was examined in relation to its potential implications for morphological distinction, compositional balance, figure-ground relationships, or apparent surface qualities. These relationships provided the basis for the synthesis matrix presented in the Results and Discussion section.

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The analysis was documented in the article through the researcher-produced source drawing, annotated visual representations, descriptive examination, and a synthesis matrix. The source drawing and analytical illustrations are presented in Figures 1–4, while Figure 5 presents the conceptual synthesis and illustrative alternatives for visual modification. The analytical illustrations distinguish observed features from proposed interpretations, whereas the synthesis matrix relates visual evidence to possible modifications and consequences requiring further evaluation. The illustrative alternatives were not treated as results of a standardized or validated transformation procedure. The study did not undertake systematic testing of transformed variants, audience-based recognition assessments, or evaluations of design performance across communication media. Consequently, its methodological scope was limited to qualitative structural interpretation and the formulation of preliminary considerations for geometric transformation rather than the demonstration of successful implementation.

RESULTS AND DISCUSSION

Morphology and Organization of Visual Elements in *Keketusan Batun Timun*

The morphological analysis of the selected *Keketusan Batun Timun* representation identified an ornamental composition consisting of elongated primary forms, supplementary ornamental elements, and intervening background areas. The primary forms exhibit curved contours that taper toward pointed ends, producing a visual resemblance to the seed-like configuration associated with the *Batun Timun* motif. The examined image is a researcher-produced redrawing of an established traditional ornament rather than a newly developed motif. Accordingly, the analysis concerns the formal characteristics of this particular representation and does not seek to establish morphological features applicable to all variations of *Keketusan Batun Timun.*

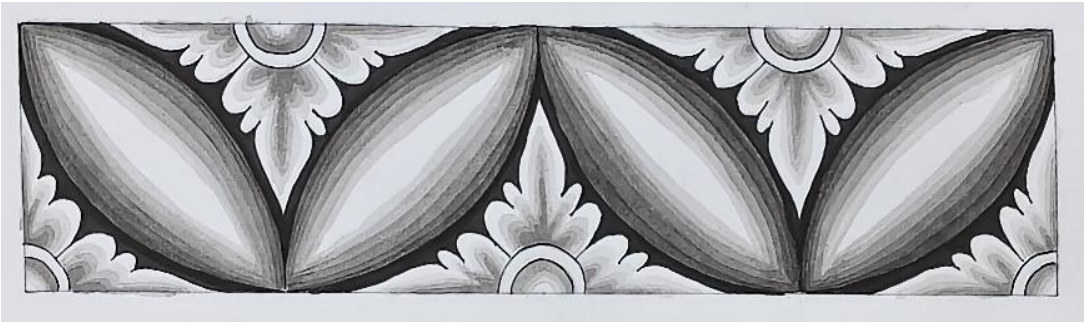

Figure 1. Researcher-produced redrawing of the traditional Balinese *Keketusan Batun Timun* ornament. The image reproduces an established ornamental configuration and serves as the primary visual material for this study. (Source: Drawing produced by the researcher based on the traditional *Keketusan Batun Timun* motif. The authorship of the traditional motif is not claimed).

Four elongated primary forms are visible within the horizontal composition. These forms are arranged into two comparable pairs, each consisting of two units with opposing diagonal orientations. Within each pair, the lower pointed ends approach a common compositional junction, while the broader contours extend outward and upward. This arrangement produces a paired configuration characterized by apparent bilateral balance. However, visual correspondence between the paired forms does not establish exact geometric symmetry, since contour dimensions, orientation angles, and proportions were not measured. The observed balance is therefore interpreted as a compositional characteristic rather than a mathematically verified relationship.

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The supplementary ornamental elements differ from the primary forms in scale, contour complexity, and internal configuration. They generally occupy smaller areas and display lobed, curved, or pointed details arranged around the primary forms. Some supplementary elements appear within the spaces between adjacent primary forms, while others are positioned along the upper and lower boundaries of the composition. Their placement contributes to the organization of the ornamental field by visually mediating between the elongated primary forms and the surrounding background. Because the traditional classifications of these supplementary elements have not been independently verified, this study uses a descriptive designation rather than assigning them specific names from Balinese ornamental taxonomy.

Figure 2 presents the morphological identification and compositional relationships observed in the selected representation. The annotated illustration distinguishes the primary and supplementary elements, their morphological differences, the opposing diagonal orientations within each pair, and the horizontal recurrence of the paired configurations. These distinctions provide a visual basis for tracing how the constituent forms are organized within the composition.

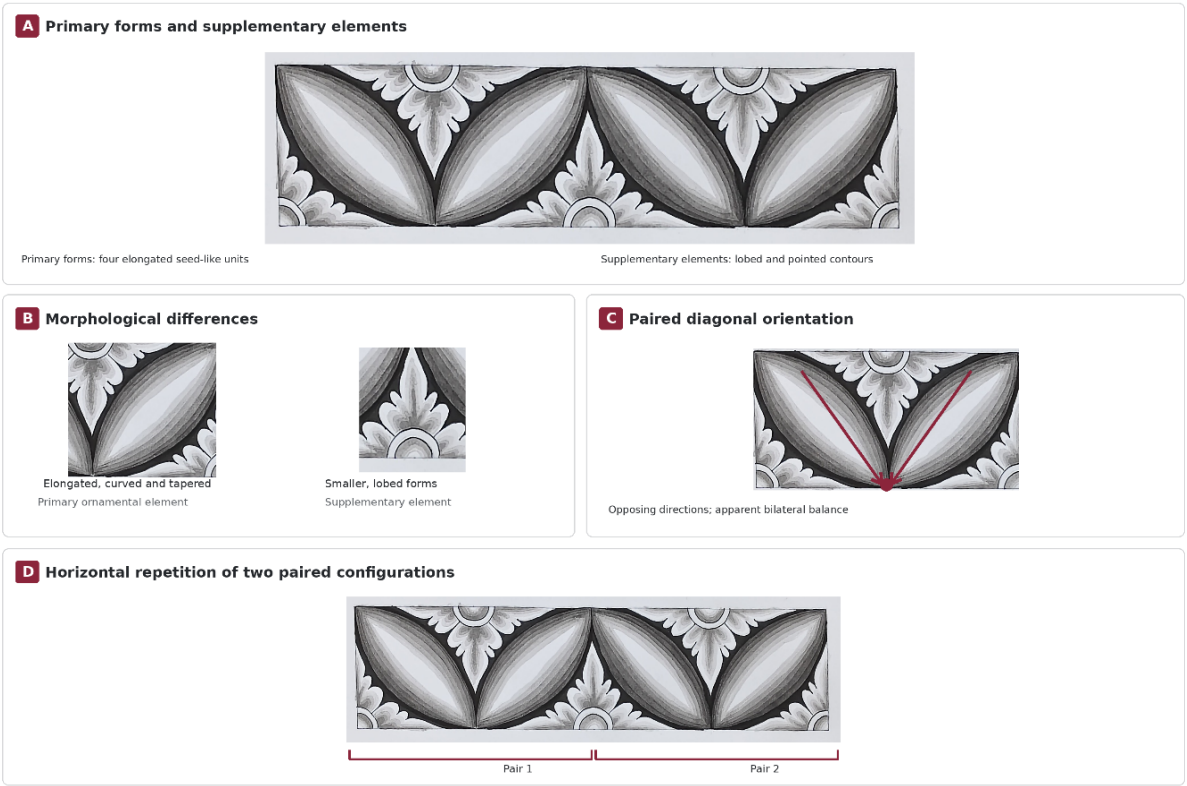

Figure 2. Morphological characteristics and organization of visual elements in the selected *Keketusan Batun Timun* representation. (A) Identification of the four elongated primary forms and supplementary ornamental elements; (B) morphological differences between the primary and supplementary forms; (C) opposing diagonal orientations within a paired configuration and their approximate point of convergence; and (D) horizontal repetition of two paired configurations. The annotations indicate relationships identified through qualitative visual examination rather than geometrically measured symmetry. (Source: Author's analytical annotations based on the researcher-produced *Keketusan Batun Timun* redrawing).

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The two paired configurations exhibit comparable visual structures across the horizontal field. Their recurrence establishes visual rhythm through repeated relationships between elongated primary forms and supplementary elements. Although the paired arrangements share similar morphological and compositional characteristics, the present analysis does not assume that their dimensions, intervals, or contours are geometrically identical. Such claims would require quantitative measurement or further geometric verification. The significance of repetition at this stage therefore lies in the observable organization of comparable forms rather than in the establishment of exact translational symmetry.

The morphological relationships identified in the selected representation can be situated within previous studies of Balinese ornamentation. Suparta et al. (2023) discuss the formal characteristics and applications of traditional Balinese ornamental forms, while Pebryani and Kleiss (2017) examine *Keketusan* patterns through symmetry analysis and *shape grammar*, including the identification of initial shapes and spatial relationships. The present analysis does not propose repetition, pairing, or symmetry as newly discovered ornamental principles. Instead, it focuses on the relationships among the primary seed-like forms, supplementary ornamental elements, and the repeated paired configurations within the particular redrawing examined. This distinction contributes to a more specific understanding of the visual organization that may need to be considered during subsequent design adaptation.

Three morphological relationships emerge from the analysis: the relationship between the two primary forms within each pair, the relationship between the primary forms and supplementary ornamental elements, and the relationship between adjacent pairs across the horizontal arrangement. These relationships provide the observational basis for the subsequent examination of geometric organization and positive-negative space. In relation to potential geometric transformation, the findings suggest that modifying an individual ornamental contour cannot be considered independently of its compositional relationships. Nevertheless, the analysis does not establish which features may be simplified or reorganized without affecting motif recognizability, as such conclusions would require further examination and evaluation of transformed alternatives.

Geometric Structure, Repetition, and Positive-Negative Space Relationships

The geometric organization of the selected *Keketusan Batun Timun* representation is characterized by opposing diagonal orientations, paired configurations, and horizontal repetition. As established in the preceding morphological analysis, four elongated primary forms are arranged into two visually comparable pairs. At the compositional level, these relationships establish three distinguishable units of analysis: the individual primary form, the paired configuration, and the horizontally repeated arrangement. Their organization is also influenced by the positions of supplementary ornamental elements and the background spaces between adjacent forms. The present analysis examines these relationships as observable compositional characteristics rather than as mathematically verified geometric structures.

Within each pair, the two primary forms extend diagonally from the upper portions of the ornamental field toward an approximate junction at the lower boundary. Their opposing orientations produce a configuration resembling the letter V, with an apparent central axis between the forms. This arrangement suggests bilateral compositional balance because corresponding forms occupy comparable positions on either side of the estimated axis. Nevertheless, visual balance must be distinguished from exact reflection symmetry. The analysis did not involve coordinate measurements, contour registration, angular comparison, or proportional verification. Consequently, the axis identified in Figure 3A is an interpretive reference for describing the arrangement, not a mathematically established axis of symmetry.

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At the level of horizontal organization, the two paired configurations recur in a comparable sequence. Their repetition establishes a visual rhythm through the recurrence of primary forms with similar directional relationships and the placement of supplementary elements around them. Figure 3B identifies the two paired configurations using approximate compositional boundaries. These boundaries were assigned through qualitative observation of the arrangement and the apparent transitions between adjacent pairs. They do not represent geometrically measured module limits, nor do they establish a fundamental repeat unit derived through formal symmetry analysis. The horizontal indicator in the figure similarly describes the visible direction of recurrence rather than a verified translation vector with a measured displacement.

The interpretation of this organization can be situated in relation to Pebryani and Kleiss (2017), who classified *Batun Timun* within the one-dimensional symmetry group *pm11*, involving vertical reflection and translation. Their analysis also examined initial shapes and spatial relationships as components of *shape grammar*. The present study uses these findings as a comparative theoretical reference but does not reproduce the geometric measurements or rule derivation required to establish the same classification for the selected redrawing. Therefore, the apparent bilateral balance and horizontal repetition identified here should not be interpreted as an independent verification of *pm11*. The contribution of this analysis lies instead in examining how visually identified paired configurations relate to supplementary ornamental elements and intervening spaces within the selected representation.

The positive-negative space relationships provide a further dimension of the ornamental structure. Positive space is defined here as the areas occupied by the elongated primary forms and supplementary ornamental elements, whereas negative space refers to the background regions visible between and around these elements. In the selected drawing, dark background areas form boundaries around the lighter primary forms and the more intricate supplementary elements. However, the distinction between positive and negative space is based on the representational roles of forms and background rather than tonal value alone. Research on figure-ground segregation also identifies local contour properties as relevant to perceptual organization (Shishikura et al., 2025). In the present study, this literature provides a contextual basis for examining contour-defined spatial relationships rather than evidence of measured perceptual responses to the *Batun Timun* representation. As illustrated in Figure 3C, the configuration of negative space follows the contours and relative positions of the surrounding ornamental elements.

Within each paired configuration, the inward-facing contours of the primary forms delimit an intervening area that broadens toward the upper portion and narrows toward their lower junction. Supplementary ornamental elements occupy portions of this area, producing a more complex relationship between the principal forms and the background. The negative space is therefore not an independently shaped empty region; its configuration is contingent upon the boundaries and placement of adjacent positive forms. A comparable relationship occurs between the two paired configurations, where supplementary elements and background regions occupy the transition between successive arrangements. These observations indicate that a description of the repeated structure must consider the spaces formed among the elements, rather than only the recurrence of their individual contours.

Figure 3D summarizes the organization through three analytical levels: individual primary forms, paired configurations, and the repeated horizontal arrangement. These levels describe different scales of compositional interpretation and should not be understood as a sequence of mathematically derived geometric operations. Together with the positive-negative space relationships, they provide a means of tracing how local form arrangements contribute to the organization of the overall ornamental field.

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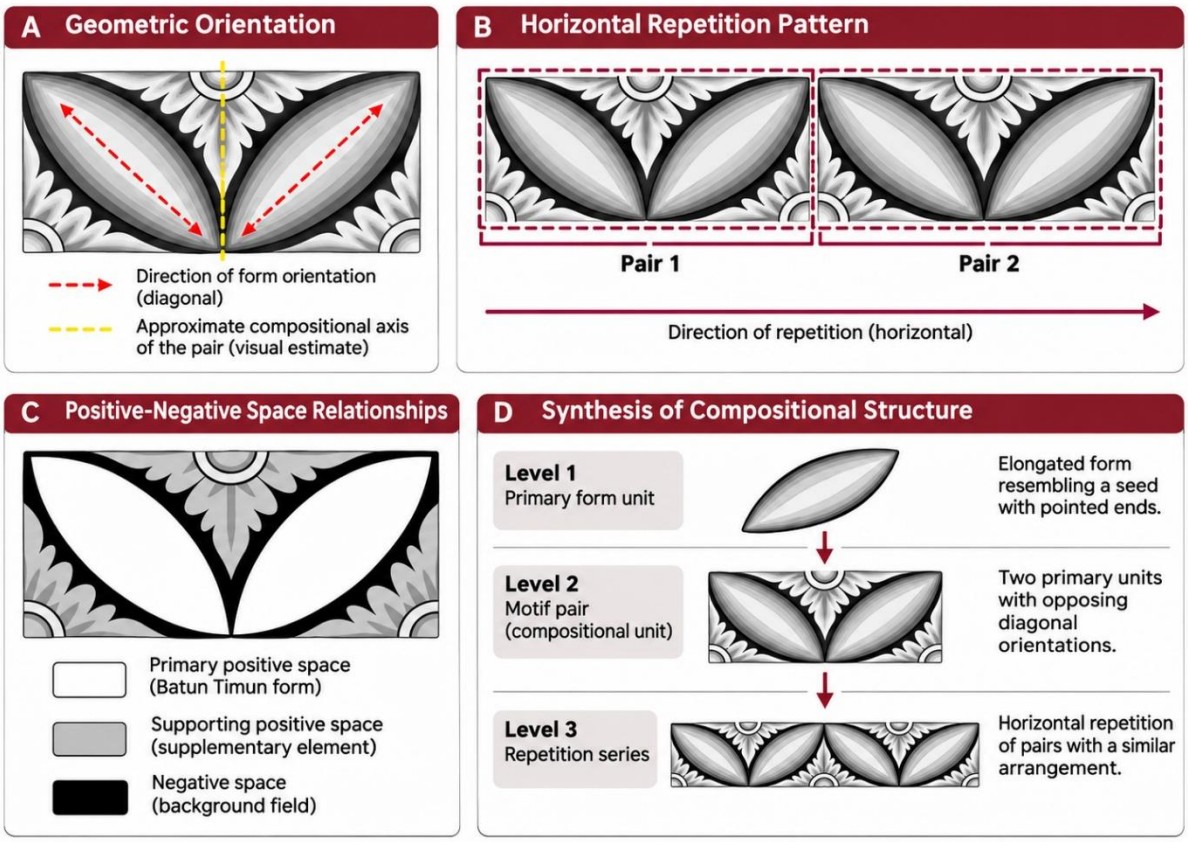

Figure 3. Geometric organization, horizontal repetition, and positive-negative space relationships in the selected *Keketusan Batun Timun* representation. (A) Opposing diagonal orientations and an approximate compositional axis within a paired configuration; (B) two visually identified paired configurations, their interpretive boundaries, and the horizontal direction of repetition; (C) positive spaces occupied by primary and supplementary ornamental forms and negative spaces corresponding to the intervening background; and (D) three analytical levels of organization comprising individual primary forms, paired configurations, and the repeated horizontal arrangement. The axes, module boundaries, and repetition indicators are qualitative analytical annotations, not results of geometric measurement or mathematical symmetry verification. (Source: Author's analytical annotations based on the researcher-produced redrawing of the traditional *Keketusan Batun Timun* ornament).

The combined analysis indicates that the selected representation is organized through relationships among directional alignment, paired configurations, horizontal recurrence, and the distribution of positive and negative spaces. These relationships provide a conceptual basis for considering geometric transformation because modifications to contour, spacing, proportion, or the placement of supplementary elements may also alter adjacent background configurations and compositional balance. Such consequences remain possibilities inferred from the observed relationships rather than outcomes demonstrated through transformed alternatives. The analysis therefore establishes spatial considerations for subsequent conceptual

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design synthesis without determining permissible transformation limits or claiming that motif recognizability would be maintained after modification.

Tonal Treatment and Apparent Visual Hierarchy of *Keketusan Batun Timun*

The selected *Keketusan Batun Timun* representation exhibits layered tonal treatment across its primary forms and supplementary ornamental elements. As illustrated in Figure 1, variations in light and dark values contribute to contour articulation, the appearance of surface curvature, and the differentiation between ornamental forms and the surrounding background. These characteristics introduce a surface-related dimension to the morphological and compositional relationships identified in the preceding analyses. Although structural organization and tonal treatment can be examined separately for analytical purposes, both contribute to the visual appearance of the selected representation.

The elongated primary forms contain successive bands of shading that generally follow their curved contours. Relatively light areas occupy substantial portions of their interiors, while progressively darker bands occur toward the outer contours. This arrangement creates an impression of curved surfaces and apparent volume within the two-dimensional drawing. Dresp-Langley and Reeves (2020) demonstrate the relevance of two-dimensional contrast and spatial cues to figure-ground organization and perceived depth. Their findings provide a theoretical context for interpreting apparent volume in the selected drawing, without implying that the tonal effects of *Batun Timun* were experimentally tested. The impression results from tonal organization rather than from the physical depth of the depicted forms. Figure 4A presents five illustrative categories of relative tonal value, ranging from lighter ornamental areas to darker regions, including the adjacent background. These categories were assigned descriptively to facilitate visual comparison. They do not represent measured pixel intensities, calibrated luminance values, or equal intervals of tonal difference.

The supplementary ornamental elements exhibit a different distribution of tonal values. Compared with the elongated primary forms, these smaller elements contain more intricate lobed and pointed contours, with shading distributed across relatively narrow ornamental areas. Figure 4B illustrates variations between their lighter details, intermediate tonal regions, and darker portions. The resulting differences in surface appearance correspond to the morphological characteristics of the depicted elements. However, tonal variation does not independently establish the traditional classification or symbolic meaning of these supplementary forms.

Tonal contrast also contributes to the relationship between the ornamental forms and the background. Relatively light portions of the primary and supplementary elements are distinguishable against adjacent dark regions. In some areas, however, darker contour-adjacent portions approach the tonal value of the background, reducing local differentiation. The visibility of these boundaries consequently depends on the arrangement of adjacent light and dark regions as well as the drawn contours. Figure 4C illustrates these relationships. Consistent with the preceding spatial analysis, positive and negative spaces are distinguished according to their compositional roles as ornamental forms and background areas, rather than by tonal value alone.

The relative scale, spatial position, contour characteristics, and tonal treatment of the primary forms provide a basis for interpreting their apparent visual prominence. Their larger areas and extended tonal transitions contrast with the smaller scale and denser internal details of the supplementary elements. These characteristics suggest differences in compositional

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emphasis, although they do not establish a fixed hierarchy of viewer attention. Figure 4D distinguishes the structural organization of the forms from their tonal surface treatment through an analytical comparison. This distinction does not imply that either aspect operates independently in the original drawing. Furthermore, the present study did not measure visual attention or conduct audience-based perception testing; therefore, the proposed hierarchy remains an interpretation based on formal visual characteristics.

The analysis identifies two interrelated dimensions of the selected representation. The first concerns structural organization, including contours, orientation, paired configurations, and spatial relationships. The second concerns the visual articulation of these structures through layered shading, tonal contrast, and apparent volume. Although these dimensions are analytically distinguishable, the configuration of each form influences the distribution of shading, while tonal differences contribute to the visibility of its contours and surface characteristics. Table 1 summarizes the principal observations, their qualified interpretations, and their evidential limitations.

Table 1. Observed Tonal Characteristics and Interpretive Limitations of the Selected Keketusan Batun Timun Representation

Analytical Aspect	Observable Visual Evidence	Qualified Interpretation	Evidential Limitation
Tonal treatment of primary forms	Successive shading bands follow elongated, curved contours, with lighter interior regions and darker contour-adjacent areas	Produces an impression of curved surfaces and apparent volume	No physical depth, lighting conditions, or luminance values were measured
Tonal treatment of supplementary elements	Smaller ornamental areas contain variations of light and dark values distributed across lobed and pointed contours	Contributes to differences in surface appearance between primary and supplementary forms	Does not establish the traditional identity of the supplementary elements
Figure-ground tonal contrast	Relatively light ornamental regions contrast with dark background areas, while some boundaries exhibit reduced local contrast	Contributes to the differentiation of ornamental forms and adjacent background regions	Local contrast was interpreted visually rather than quantified
Relative scale and compositional emphasis	Primary forms occupy larger areas and display broader tonal transitions; supplementary elements contain denser details	Supports an interpretation of apparent visual prominence of the primary forms	Viewer attention and perceived visual hierarchy were not empirically evaluated

(Source: Author's qualitative visual analysis of the researcher-produced Keketusan Batun Timun redrawing. Observations and interpretations are based on the selected visual representation without instrumental tonal measurement or audience-based evaluation).

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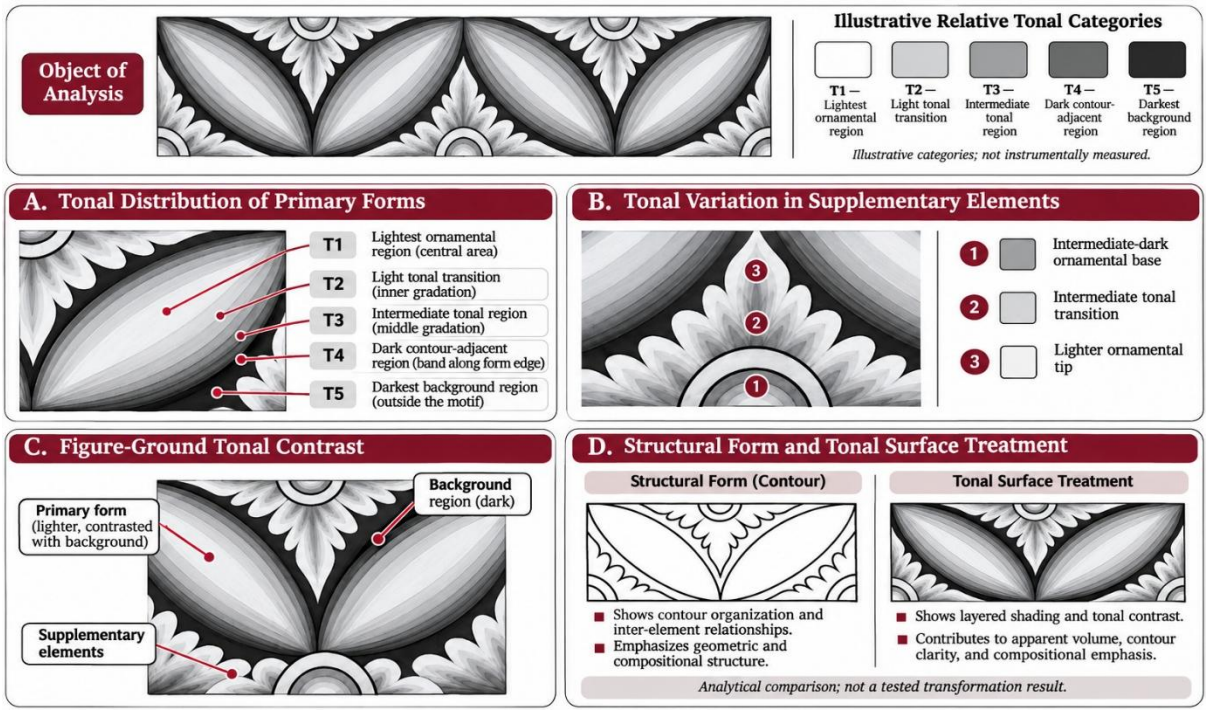

Figure 4. Tonal distribution, surface treatment, and apparent visual hierarchy in the selected *Keketusan Batun Timun* representation**.**
(A) Five illustrative categories of relative tonal value identified across ornamental and background areas; (B) tonal variation within supplementary ornamental elements; (C) contrast relationships between ornamental forms and adjacent background regions; and (D) analytical comparison between structural form and tonal surface treatment. The five tonal categories are qualitative distinctions rather than calibrated intensity measurements. Apparent visual prominence is interpreted from formal characteristics and does not represent measured viewer attention. (*Source: Author's analytical illustration based on the researcher-produced Keketusan Batun Timun redrawing).*

The distinction between structural organization and tonal treatment provides a basis for considering possible visual modifications in contemporary visual communication design. While the contours and spatial relationships identified in the preceding analyses remain relevant to the organization of the ornament, layered shading presents an additional characteristic whose level of detail may be reconsidered during graphic simplification. However, reducing tonal variation could modify the impression of volume, local contrast, and compositional emphasis. These possibilities have not been established through systematic comparisons of transformed variants. Tonal reduction is therefore treated as a conceptual design consideration rather than an empirically demonstrated means of preserving the ornament's visual characteristics.

Overall, the findings indicate that the visual organization of the selected *Batun Timun* representation involves both structural relationships and tonal surface treatment. The analysis extends the preceding morphological and geometric examinations by identifying how layered shading and figure-ground contrast contribute to apparent volume and compositional differentiation. Its contribution to the subsequent synthesis lies in specifying the tonal characteristics that warrant consideration when developing potential geometric transformations. The effects of such modifications on motif recognizability, visual

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composition, and communication performance remain outside the empirical scope of the present study.

Synthesis of Geometric Transformation Considerations for Contemporary Visual Communication Design

The preceding analyses identified interrelated morphological, compositional, spatial, and tonal characteristics in the selected *Keketusan Batun Timun* representation. The elongated primary forms, supplementary ornamental elements, paired configurations, horizontal repetition, positive-negative space relationships, and layered shading collectively contribute to its visual organization. These findings provide a basis for formulating conceptual considerations for geometric transformation. The synthesis distinguishes three analytical categories: morphological characteristics, compositional relationships, and surface qualities. Rather than establishing universal transformation rules, these categories help identify which visual relationships may be affected when selected elements are modified for contemporary visual communication design.

Morphological considerations concern the contours, proportions, and distinguishing features of the primary and supplementary forms. The elongated contours and pointed ends of the primary forms provide a basis for examining possible contour reduction or simplification. However, the importance of these characteristics for motif recognizability has not been established through audience evaluation. Compositional considerations concern the opposing diagonal orientations, paired arrangements, horizontal repetition, and relationships between ornamental forms and intervening negative spaces. Modifications to spacing, orientation, or repetition may alter the apparent balance and organization of the composition. Surface-related considerations concern layered shading, tonal contrast, and apparent volume. Reducing tonal detail may change the representation of curved surfaces and the visual distinction between ornamental elements and their background.

Table 2 synthesizes these relationships by linking observable characteristics to possible design modifications and formal consequences requiring examination. The proposed modifications are distinguished from the findings of the preceding visual analysis. They constitute conceptual design considerations rather than established criteria for preserving the ornament's identity or ensuring successful transformation.

Table 2. Synthesis of Visual Characteristics and Conceptual Considerations for Geometric Transformation of Keketusan Batun Timun

Visual Aspect	Observable Characteristics	Proposed Design Consideration	Formal Consequences to Examine	Illustration in Figure 5
Primary morphology	Elongated forms with curved contours and pointed ends	Contour simplification or selective reduction of detail	Changes in contour configuration and distinction between primary and supplementary forms	Alternative A emphasizes contour structure; geometric contour simplification is not isolated

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Paired configuration	Two primary forms with opposing diagonal orientations	Adjustment of proportions, orientation, or spacing	Changes in apparent bilateral balance and relationships within each pair	Paired arrangements remain visible in A–C; systematic adjustments are not tested
Horizontal repetition	Comparable paired arrangements recur across the source drawing	Variation in the number and arrangement of repeated units	Changes in repetition, spatial distribution, and compositional rhythm	Alternative C
Supplementary ornamental elements	Smaller lobed and pointed forms occupy areas around and between primary forms	Selective detail reduction or rearrangement	Changes in relationships between primary and supplementary elements	Supporting forms remain visible in A–C, but their independent modification is not examined
Positive-negative space	Background regions are defined by adjacent primary and supplementary contours	Modification of spacing or figure-ground treatment	Changes in background configuration, boundary differentiation, and spatial relationships	Alternative A changes figure-ground treatment; C changes the displayed repetition
Tonal surface treatment	Layered shading follows the contours of ornamental forms	Reduction of shading complexity or tonal gradation	Changes in apparent volume, local contrast, and compositional emphasis	Alternative B; substantial tonal reduction is also present in A

(Source: Author's analytical synthesis based on the researcher-produced Keketusan Batun Timun redrawing and the formal observations presented in Figures 1–4. Proposed modifications are conceptual considerations, while their possible consequences require further evaluation).

Figure 5 connects the findings of the preceding analyses with illustrative possibilities for graphic modification. Its upper section summarizes the observed visual characteristics and the categories used in the synthesis. The lower section presents a reference representation alongside three alternatives: a contour-based representation (A), tonal simplification (B), and illustrative modular repetition (C). These alternatives allow selected formal changes to be examined descriptively. They were not developed as controlled experiments in which individual visual variables were systematically isolated.

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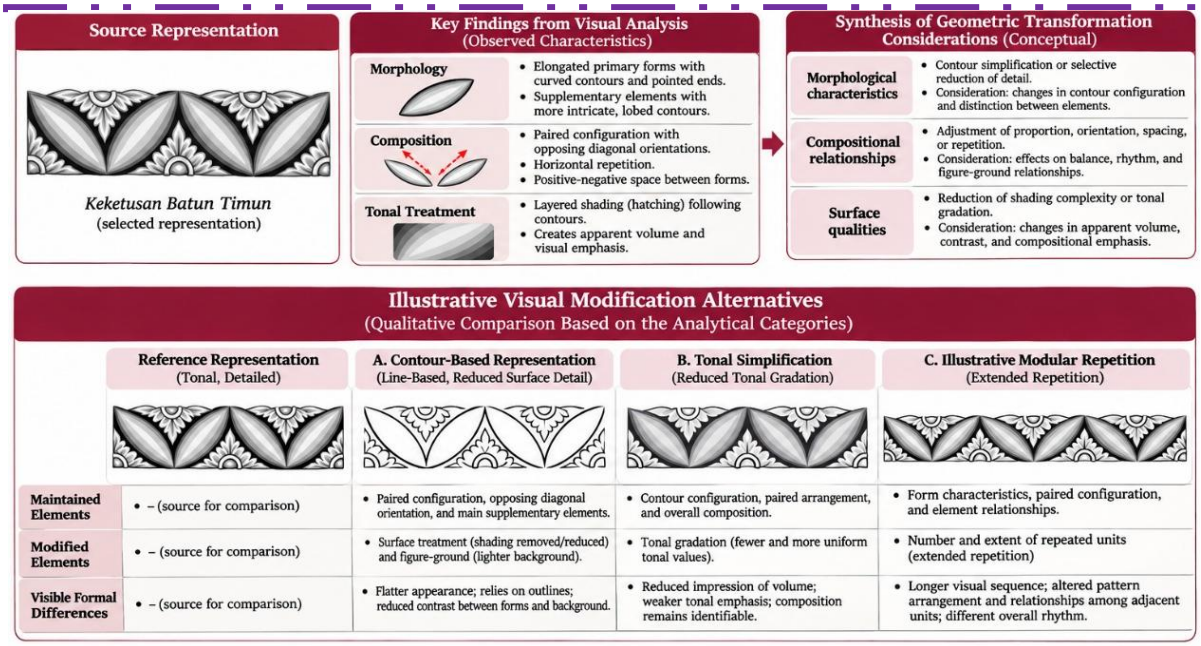

Figure 5. Analytical Synthesis and Illustrative Visual Modification Alternatives for the Selected *Keketusan Batun Timun* Representation.
The upper section connects the source representation with observed morphological, compositional, and tonal characteristics and their corresponding conceptual transformation considerations. The lower section compares the reference representation with three illustrative alternatives: (A) contour-based representation, (B) tonal simplification, and (C) illustrative modular repetition. These alternatives are intended for qualitative visual comparison and do not constitute controlled transformations or empirically validated design outcomes. (Source: Author's analytical synthesis and illustrative modifications based on the researcher-produced redrawing of the traditional *Keketusan Batun Timun* ornament*)*.

Alternative A presents a contour-based representation of a paired ornamental configuration. The elongated primary forms, opposing diagonal orientations, and simplified supplementary contours remain visible. Compared with the tonal reference, the illustration substantially reduces layered shading and removes much of the dark background treatment. The composition consequently relies more strongly on drawn outlines to distinguish ornamental forms. This produces a visibly flatter representation and changes the contrast between the forms and their surrounding field. However, these differences cannot be attributed specifically to geometric contour simplification because tonal treatment and figure-ground presentation are also modified.

Alternative B retains the general configuration of the paired primary forms while reducing the complexity of tonal gradation. The elongated contours and opposing orientations remain apparent, whereas the extended shading bands that contribute to the impression of curved surfaces are less differentiated. The resulting illustration presents a flatter surface appearance while retaining some tonal distinction between the ornamental forms and the background. This comparison provides a concrete example of how reducing surface detail may alter apparent volume and local contrast. It does not demonstrate that the modified representation is more legible, more recognizable, or better suited to any particular communication medium.

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Alternative C presents additional repetitions of a comparable paired configuration within the displayed ornamental field. The elongated primary forms and opposing diagonal relationships remain apparent, while the arrangement extends the repeated visual sequence. The change introduces additional relationships among neighboring paired configurations, supplementary elements, and intervening background regions. Accordingly, the example illustrates how expanding a repeated arrangement may alter the organization of the overall pattern. Because the source and alternative are displayed at different extents and potentially different scales, the illustration does not provide a controlled basis for determining changes in spacing, proportional equivalence, or visual density.

The comparison reveals that the three alternatives preserve and modify different aspects of the source representation. Alternative A retains the paired form organization while substantially changing its surface and figure-ground presentation. Alternative B retains the general contours while reducing tonal differentiation. Alternative C retains a visually comparable paired configuration while extending the repetition within the illustrated composition. None of these examples isolates all other variables, and the visual differences should therefore be interpreted as characteristics of the illustrated alternatives rather than causal effects of individual transformation operations.

The relationship between Table 2 and Figure 5 constitutes the principal analytical contribution of this synthesis. Table 2 specifies the observed characteristics, possible modifications, and formal consequences requiring examination, whereas Figure 5 provides selected visual examples through which these considerations can be discussed. Together, they indicate that conceptual geometric adaptation of the selected ornament requires consideration of relationships among contours, supplementary elements, tonal treatment, and surrounding spaces rather than isolated modification of individual forms. Surface reduction also affects the representation of volume and contrast, while changes in repetition influence relationships among primary forms, supplementary elements, and background regions. This synthesis therefore extends the preceding formal description into a case-specific framework for examining the interdependence of visual characteristics during possible design modification.

For contemporary visual communication design, the framework offers preliminary guidance for exploring simplified ornamental graphics and repeated decorative patterns. Ware (2021) discusses perceptual principles relevant to visual display design, including contrast, visual salience, and pattern organization. These principles provide a broader rationale for examining the visual consequences of graphic modification, although the present study has not evaluated them through audience-based testing. Its application would require subsequent design development under defined media conditions, together with consistent visual comparisons and evaluations of motif recognizability, cultural interpretation, and communication performance. The present study does not establish universally applicable transformation rules or demonstrate the effectiveness of the illustrative alternatives. Its contribution is limited to an evidence-linked analytical synthesis that identifies visual characteristics and relationships requiring consideration when developing future graphic adaptations of the selected *Keketusan Batun Timun* representation.

CONCLUSION

This study examined the visual structure of a selected *Keketusan Batun Timun* representation and its potential relevance to geometric transformation in contemporary visual communication design. The findings identified interrelated morphological, compositional,

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spatial, and tonal characteristics, including elongated primary forms, paired configurations, horizontal repetition, supplementary ornamental elements, positive-negative space relationships, and layered shading. Rather than functioning as isolated features, these characteristics collectively organize the selected representation and provide a basis for considering how modifications to individual elements may affect the surrounding visual structure.

The principal contribution of the study is the synthesis of three interrelated categories of conceptual transformation considerations: morphological characteristics, compositional relationships, and surface qualities. These categories connect observable visual evidence with possible modifications and formal consequences requiring further examination. The illustrative alternatives further demonstrate how contour-based representation, tonal simplification, and extended repetition can produce distinguishable changes in surface appearance, figure-ground relationships, and compositional organization. The resulting framework therefore extends formal ornamental description into a case-specific approach for examining visual interdependencies during potential design adaptation. It does not establish a standardized or validated geometric transformation procedure.

The findings are limited to a single researcher-produced redrawing of an established traditional motif. The illustrative modifications were not developed as independently controlled transformations, and their effects on motif recognizability, cultural interpretation, or communication effectiveness were not evaluated. Consequently, the proposed considerations cannot be generalized to all *Keketusan Batun Timun* variations or assumed to preserve their visual identity across different media. Future research should develop systematically comparable design variants and examine their formal characteristics, motif recognizability, and suitability for specific visual communication applications. Within these limitations, the study offers an evidence-linked conceptual basis for further exploration of traditional Balinese ornamentation in contemporary graphic design.

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