

# A Methodological Framework for Cross-Cultural Design Using Yixing Teapots and Andean Textiles

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## Abstract:

Cross-cultural design often lacks clear methods to effectively communicate and understand the deep meanings of different cultures and traditions, increasing the risk of superficial cultural borrowing. To address this problem, we propose and validate a three-stage combination strategy, using the geometric translation of the “Three Friends of Winter” motifs from Chinese Yixing purple clay teapots to Andean fabric as a case study. This process involves analyzing the original artistic form through shape-decomposition techniques (contour extraction, hue-saturation-value (HSV) color model, etc.), followed by creative decomposition and reorganization according to the Andean quadrant division and the corresponding yin-yang principle. The results show that the transformation method converts three-dimensional forms into graphic designs and embeds the symbolic images of pine, bamboo, and plum into the Andean modular grid system, retaining their essential characteristics while conforming to the construction rules of the target culture. The quantitative color palette generated by HSV analysis also ensures an authentic expression of the Yixing raw ore purple clay material. We conclude that this work provides a rigorous, reliable, replicable, and non-colonial framework for promoting practical exchanges between people from different cultural backgrounds.

## Keywords:

Andean Textiles, Cross-cultural Design, Design Methodology, Geometric Translation, Intercultural Fusion, Symbolic Transposition, Yixing Teapots

## 1. Introduction

Globalization, a phenomenon characterized as the economic, political and cultural interconnection of national and regional cultures influenced by international trade and global institutions [1] has fostered a progressively interconnected world. This process enables the extensive dissemination of uniform goods and services, Rugman & Collinson, 2006, as cited in [1], although it also possesses a potent homogenizing force that may jeopardize local cultural expressions. However, authors like Steger [2] argues that in addition to this dynamic, there are also strong “tendencies towards cultural diversification and hybridization” [2]. These opposing forces build a complex and often paradoxical landscape, where cross-cultural design emerges not as a tool for further homogenization, but as a pivotal strategy for fostering meaningful dialogue

between cultures. From this approach, design transcends the view of working for a “globalization of markets” and moves towards a “globalization of understanding”, where it acts as a medium for development through cultural exchange. Because of this globalized context, utilizing a cross-cultural approach is crucial in designing new objects, notwithstanding their final goal. This is particularly important in the context of designing for global south cultures, especially when it is between countries whose historical relationship has been relatively scarce but nowadays have been continuously increasing, which is the case of China and Ecuador (Andean region). This approach offers a different view of globalization that is not focused on the west, and it opens new ways for cultural and intellectual exchange.

To achieve authentic cross-cultural design, it is necessary in a first instance a deep comprehension of both the participating cultures and the foundational concept of culture. Accordingly, this study adopts the definition of culture as “a system of shared beliefs and values that are learned rather than inherited” [1]. This shared belief system serves as a form of collective programming of the mind that allows people to distinguish the members belonging to one group from others [3] and it can be expressed through symbols, rituals, values and prominent figures such as collective heroes [3]. At the same time, culture can be understood as sociosemiotic in nature. This suggests that a system of shared beliefs and values are considered signs, composed of “signifiers” (a pattern or form) which is linked to their corresponding “signified” (what it signifies, the meaning), [1] that were established in a specific societal context through a meaning making process [4]. Thus, a sign meaning is inherently bound to its societal context. Hence, a signifier that appears similar across different cultures can carry distinct meanings within each. From this perspective culture is revealed as a form of communication such as an ongoing process that conveys and solidifies group norms Hall & Hall, 1990, as referred in [1] while also facilitating their evolution. Consequently, designing objects transcends beyond functionality or appearance, objects themselves are cultural carriers of meaning, “texts” that can be decoded.

A common problem in modern design is that people tend to take visual motifs without considering their deeper cultural significance. As previously stated, the meaning of a sign is culturally dependent; therefore, if the designing process aims to remain respectful of the participants into the intercultural communication, it must pay attention to the translation of those signs. Achieving this requires a design methodology grounded in collaboration, understanding and respect, acknowledging that successful cross-cultural communication depends more on “eliciting the appropriate responses that conveying the correct message”, Hall & Hall, 1990, as cited in [1]. For this reason, this study applies a semiotic approach in the process of designing new objects that tie different cultures. This method entails an extensive “decoding” of the cultural symbols embedded in an object to understand both their denotative (literal) and connotative (symbolic, value-laden) meanings. This perspective aligns with dual-coding theory, which states that information is processed through both verbal and nonverbal imagistic cognitive channels, with meaning being enriched when both are engaged simultaneously [5]. Hence, the aim of cross-cultural design shifts from producing a singular, global aesthetic toward cultivating what Escobar [6] calls a “Pluriverse”, a world where many worlds coexist.

Within this methodological framework, Yixing pottery serves as a compelling point of departure. Commonly known as Zisha, Yixing ware occupies a renowned position in Chinese ceramic art. It is distinguished by a profound integration of material, form

and maker. Artisans in the Yixing, Jiangsu Province (historically known as China's "pottery capital"), work with a local iron-rich clay noted for its plasticity and responsive color range under varying firing conditions [7][8]. Each teapot is constructed entirely by hand, a process that privileges individual gesture and sculptural exploration over standardized production [7]. The maker's sensitivity to the clay governs both the vessel's structural integrity and its expressive potential, resulting in functional objects that are simultaneously works of art.

On an aesthetic level, the value of Yixing teapots resides in their three-dimensionality and nuanced surface articulation. Artisans employ techniques such as modeling, carving, stamping, incising, and appliqué to shape the clay and enhance its textural and visual complexity [9][10]. These works are often classified by their form: "round", "square", "veined" and "sculpture ware". Sculpture ware integrates body, handle, lid, and spout into cohesive forms, often representing animals, plants, or hybrid motifs, where functional components emerge organically from the sculptural composition [11][8]. Historical artisans such as Chen Mingyuan exemplified this approach, creating teapots that combine realistic botanical motifs with carefully balanced silhouettes, producing objects whose presence exceeds mere utility [11].

Yixing teapots have largely been studied within established aesthetic and regional frameworks. However, despite their cultural significance and technical sophistication, they have rarely been examined from an intercultural perspective. This has led to a certain scholarly stagnation, where appreciation often reiterates traditional interpretations without expanding or innovating upon them. For this reason, this study addresses that underdeveloped niche by proposing a renewal of Yixing's symbolic heritage through an external, yet culturally respectful viewpoint.

To broaden the appreciation and application of this sculptural tradition, the present research examines the pine, bamboo, and plum motifs in Yixing pottery from an Andean-Ecuadorian perspective. This insider-outsider stance facilitates a critical interpretation of Yixing forms, positioning the designer as a cultural interlocutor rather than an uncritical imitator. At the same time, Andean philosophical concepts such as relationality and correspondence support the mapping of volumetric ceramic forms onto geometric textile structures and provide a rationale for intercultural transposition [12]. Traditional Andean textiles encode identity and cosmology through modular geometry, including stepped diamonds (chakanas), zigzags, and reciprocal motifs, which structure space proportionally and symbolically [13][14]. This approach aims to create new interpretative pathways related to nature and human expression, connecting two geographically distant but philosophically aligned cultures.

Yixing zisha teapots represent a unique convergence of geology, craftsmanship, and cultural philosophy, standing as a pinnacle of Chinese ceramic artistry. Their foundational material, Yixing clay, is not a singular substance but a spectrum of mineral-rich soils, primarily categorized into three types: purple clay (zini), green clay (lüni), and red clay (hongni) [9]. This distinct clay body, characterized by its high iron content and a unique aggregated structure filled with micro-pores, is fired at temperatures between 1100°C and 1200°C [9]. The resulting material is both highly porous, a quality celebrated for enhancing the flavor of tea, and remarkably durable, allowing for the intricate sculptural work that defines the art form. This combination of utility and artistic potential is the very essence of the pottery.

The evolution of Yixing teapots from a local craft to a cultural symbol is inextricably linked to the development of Chinese tea culture and literati aesthetics. Li

and Liu [8] note a significant shift in taste by the mid-Ming Dynasty, by declaring: “In recent centuries, silver, tin, and porcelain teapots from Fujian and Henan were abandoned in favor of Yixing pottery” [8]. This shift towards Yixing pottery seems backed by other sources, like scholar Li Yu in his book *Casual Notes of a Leisure Class*, where he states that “there is no better vessel for tea than purple sand, and the finest pots come from Yixing” [8]. This support from the literati elite changed the conception of Yixing teapots from a simple tool to a symbol of good taste linked to academic identity, which suggested that people should think about the world in an intellectually and aesthetically way.

Artisans employ a range of techniques to convey aesthetic intention as well as symbolic meaning, transforming a practical vessel into a cultural artifact that embodies philosophical, ethical, and natural associations [8][9]. However, there are four principal techniques that generate distinct textures and forms of relief elements that are essential for their later interpretation within a two-dimensional textile context.

**Pottery Carving (Diao Ke)** This technique consists in engraving designs directly onto the clay surface. The result is a network of fine linear patterns, inscriptions, and symbolic motifs that form a shallow relief. Its visual impact is shaped through the interplay of light and shadow, functioning almost as a calligraphic layer upon the clay.

**Sculpture (Su Xiang)** This technique creates strong relief and a tangible presence, enabling the teapot to take on natural forms rather than simply illustrating them. The shapes become almost sculptural extensions of nature itself, inviting viewers to experience the form as both visual and tactile.

**Clay Painting (Ni Hui)** In this method, colored clay slips are applied much like paint to add tone, contrast, and emphasis. While it does not create texture in the same way as carving or sculpting, it plays a crucial role in highlighting symbolic elements for instance, the green of a bamboo leaf or the soft pink of a plum blossom. Through color, it brings a narrative and expressive dimension to the sculpted forms, enriching both their visual and symbolic impact.

**Enamel (You Cai)** This method uses glass enamels to provide a shiny, multicolored surface. It focuses on ornamental beauty and makes symbolic colors stand out more, but it is not a part of the clay’s natural structure or texture; it is only a surface layer. Unlike the previous methods, enamel remains a surface layer rather than being integrated into the clay’s intrinsic structure.

There is a close connection between theory and practice in Yixing pottery making. The systematically application of these techniques over time is what made Yixing teapots develop its repertoire of highly encoded symbols, where each technique has corresponding patterns of decorative elements to be expressed on. The following table categorizes the common decorative techniques, motifs, and their symbolism in Yixing teapots, based on an analysis of exhibition catalogues, visual sources, museums and literature.

**Table 1.** *Summary of decoration Techniques..*

| Visual Example                                                                     | Decoration Element | Decoration technique  | Implied textural Quality      |
|------------------------------------------------------------------------------------|--------------------|-----------------------|-------------------------------|
|   | Pine Bark Texture  | Sculpture and carving | Rough, Grooved, volumetric    |
|   | Bamboo Stalk       | Sculpture and carving | Smooth, Segmented, linear     |
|   | Plum Blossoms      | Sculpture and carving | Delicate, Layered, Low relief |
|  | Inscribed Poetry   | Pottery Carving       | Fine, linear Shallow relief   |

*all the pictures were taken by the author in Yixing purple sand Museum. The table shows the specific features of relief, shape and texture of Yixing purple clay pot, and provides a typological basis for the classification of elements in cross-cultural translation in subsequent studies.*

The “Three Friends of Winter”, comprising the pine, bamboo, and plum, constitutes a foundational motif in Chinese cultural expression. It was selected for this study due to its profound symbolic density. As Wu Shan [9] details, the motif originates from a long literary and artistic tradition, celebrating these three plants for their resilience in harsh cold, collectively symbolizing the unyielding spirit of the virtuous gentleman.

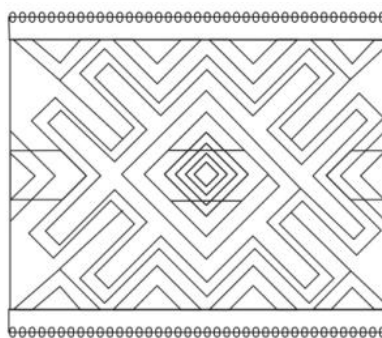
Each plant carries distinct, culturally rooted virtues. The pine (song) symbolizes endurance, longevity, and steadfastness. This is reflected in classical texts such as The Analects, which states, “Only when the year grows cold do we see that the pine and cypress are the last to fade” [9]. The pine’s evergreen nature represents perseverance through adversity, a virtue Welch [15] further emphasizes by noting its association with longevity, often depicted alongside mossy rocks or cranes [15]. Bamboo embodies integrity, resilience, and humility. Its hollow stem is understood to symbolize an open mind and modesty, bending without breaking, representing both moral strength and flexibility [9]. Welch [15] corroborates this, describing bamboo as a metaphor for moral virtue where its hollow stems signify an open mind and its flexibility conveys integrity in adversity [15]. The plum signifies hope, renewal, purity, and endurance. As the first tree to bloom amidst winter snow, it represents the promise of spring and the beauty of enduring hardship with grace [9]. Its five petals are traditionally associated with the “Five Blessings” (fortune, wealth, longevity, health, and peace). Welch [15] adds that while its late-winter blooms signify hope and endurance, the transient nature of the petals evokes beauty, purity, and life’s ephemeral quality [15].

These abstract virtues are rendered tangible through Yixing techniques. A prime example is the Chen Ming-yuan Three Friends teapot, where the arrangement of pine, bamboo, and plum logs demonstrates both technical virtuosity and profound symbolic intention. The spout emerges from a plum branch, the handle is formed by a pine branch, and the knob is depicted as bamboo extending upward. Layered blossoms, carefully sculpted from clay and enhanced with colored slips, contrast with the rough textures of the pine and bamboo surfaces, physically embodying delicacy, strength, and resilience simultaneously [16]. Thus, the artisan's choice to sculpt the pine with a rough, grooved texture or to carve the bamboo with clean, sharp lines translates philosophy directly into form.

Based on this translation from abstract philosophical concept into material form, this research posits that by deconstructing how these cultural meanings are physically constructed through the interplay of sculpture, carving, and painting, their essential principles can be extracted. In other words, is possible to isolate the idea of “endurance” embedded in a rough texture, the concept of “resilience” conveyed in a flowing, unbroken line, and the “hope” expressed in a delicate, layered form. It is this detailed understanding of the object's symbolic and tactile language that establishes Yixing teapots as an ideal subject for study and adaptation to other cultures. The “Three Friends of Winter” motif, therefore, exemplifies the seamless integration of craftsmanship, natural representation, and moral philosophy, providing a robust methodological anchor for the subsequent stages of design and analysis in this study.

To interpret the three-dimensional and culturally rich symbolism embedded in Yixing teapots, this study adopts a decolonial framework grounded in the structural and philosophical principles of Andean textile geometry. This approach aligns with Escobar's [6] call for “new modes of earthly habitation” that challenge extractive, modernist design paradigms and opens a space for a relational, pluriversal worldmaking. Within this perspective, the Andean lens is not simply a repository of motifs but an epistemic stance that encompasses an ordered way of perceiving, structuring, and re-creating the world.

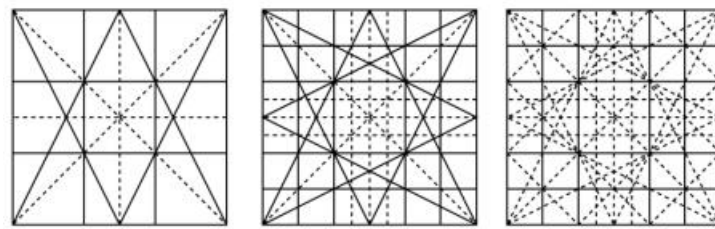
The methodological foundation of this project is encapsulated in Zadir Milla's key assertion of “To think is to organize and to organize is to design”. It reflects an Andean design-thinking paradigm in which ordering is not merely a visual operation but an act of cosmological alignment and creative generation. This logic resonates with what Estermann [12] identifies as the Andean worldview: relationality, complementarity, and the productive tension of dualities.



**Figure 1.** Modular grid from Woven belt, Cusco. Community of Q'ero. Reprinted from Durand [14].

In the case of Andean textiles, they embody this philosophy through geometric systems that organize space according to balance, reciprocity, and symbolic density.

Modular grids stepped diamonds (chakana), and reciprocal configurations function as cognitive and cosmological frameworks [12]. Historically, textiles served as a form of “symbolic capital” and a true “manifesto of civilization,” by encoding social, political, and cosmological order into material form [13]. In this study, the Andean lens is used not for the appropriation of surface aesthetics but to activate this deep structural logic as a method of interpretation and design translation. In this sense, the compositional precision of Andean geometry thus becomes a receptive matrix for re-encoding the volumetric and symbolic language of Yixing teapots. This operation reflects what Escobar [6] describes as metro fitting: creating alternative infrastructures for life and meaning by drawing on situated cultural knowledge. Thus, in this case, ordered grids, when used as cultural frameworks, enables a co-creative practice that brings widely disparate ways of knowing into structured dialogue [6].



**Figure 2.** Tertiary harmonic tracing. Reprinted from Milla [17].

To articulate this intercultural translation process, the study incorporates Stuart Hall’s encoding/decoding model. Originally formulated in television and media studies, Hall’s theory explains how meanings are encoded by producers and decoded by audiences within specific cultural contexts [1]. Contemporary interpretations, such as those summarized by Xie[18], emphasize that encoding involves transforming meanings, intentions, and cultural viewpoints into symbolic codes, whereas decoding refers to the interpretation or re-creation of these meanings by receivers. Because decoding is shaped by cultural background, values, and epistemic frameworks, the process becomes especially complex in transcultural contexts.

This study adapts Hall’s model, by framing a three-phase methodology as a process of decoding the symbolic language of Yixing teapots to re-encode it within the geometric logic of Andean textiles. This integration clarifies the epistemic movement from object to concept, and from material form to intercultural reinterpretation, while grounding the methodology in both semiotic and decolonial theory.

To summarize, this study and its methodological architecture is grounded in intercultural ethics. As Estermann [12] states, authentic interculturality rejects both monocultural supremacy and the postmodern claim that cultures are fully incommensurable. Instead, it embraces a “minimum of commensurability” that makes ethical dialogue possible. Within this ethical space, the translation undertaken in this study is not a superficial fusion of styles, nor an extractive act of cultural borrowing. Rather, it is a collaborative negotiation of meaning, recognizing that contemporary design operates within systems of distributed agency [6].

## 2. Materials and Methods

This study proposes a hybrid fusion methodology to effectively bridge the three-dimensional sculptural language of Yixing teapots with the two-dimensional geometric logic of Andean textiles. Conceived as both analytical and creative, this process ensures a respectful and meaningful transference of symbolic content rather

than superficial motif appropriation. The methodology unfolds through three sequential phases: technical-formal analysis of source material, creative decomposition into essential layers, and Andean textile recomposition.

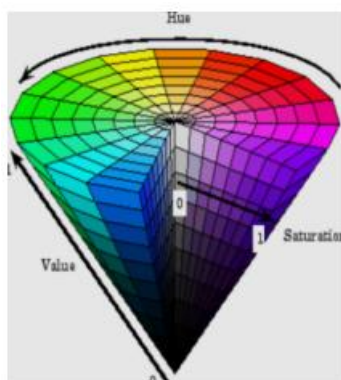
### ***2.1. Phase 1: Technical-formal analysis of teapots***

The first phase consists of a close, systematic examination of selected Yixing teapots bearing pine, bamboo, and plum motifs. A corpus of 250 Yixing teapots was assembled through fieldwork and literature review, drawing on master artisans' works and institutional holdings (including the Yixing Purple Clay Teapot Museum, Wuxi Museum, and documented workshop pieces from Yixing village). From this corpus, pieces exhibiting the "Three Friends of Winter" motif received priority. For exposition purposes, an exemplary teapot from the Yixing Purple Clay Teapot Museum was selected due to its clear and masterful integration of pine, bamboo, and plum blossom motifs into a cohesive sculptural form, facilitating detailed deconstruction and analysis.

The objective of this phase is to document and quantify visual and tactile properties that will serve as foundational data for formal translation. Each region of the example teapot was analyzed to identify and catalogue the specific decorative techniques utilizing the typology in order to carry out this phase, the methodology involved was silhouette extraction and decomposition of color properties.

#### ***2.1.1. Silhouette extraction and HSV color model application***

The formal analysis of Yixing teapots follows a dual approach. First, the abstraction of the macro-form through silhouette extraction and second, the decomposition of color properties using the Hue–Saturation–Value (HSV) color model. Both processes used high-resolution photos of Yixing teapots taken with uniform lighting.



***Figure 3. HSV Color Model single hex cone. Reprinted from Ibraheem et al. [19].***

The transformation from the RGB to the HSV color space is a fundamental next step, because the HSV model delineates hue, saturation, and brightness into perceptually significant channels, in contrast to device-dependent RGB [19]. Hence, it improves statistical color analysis and feature extraction for cultural heritage artifacts [20]. Following the standard conversion algorithm outlined by Ibraheem et al. [19], for RGB values normalized to the range [0, 1], the components are calculated as follows:

First, the maximum (M) and minimum (m) values among the R, G, and B components are found:

$$M = \max(R, G, B), m = \min(R, G, B)$$

The value (V) is defined as:

$$V = M$$

The saturation (S) is then calculated:

$$S = \begin{cases} 0 & \text{if } M = 0 \\ \frac{M - m}{M} & \text{otherwise} \end{cases}$$

The hue (H) is determined by the following case-based calculation:

$$H = \begin{cases} 0 & \text{if } M = R \\ 60^\circ \times \frac{G - B}{M - m} + 0^\circ & \text{if } M = R \\ 60^\circ \times \frac{B - R}{M - m} + 120^\circ & \text{if } M = G \\ 60^\circ \times \frac{R - G}{M - m} + 240^\circ & \text{if } M = B \end{cases}$$

If negative,  $360^\circ$  is added to normalize it into the range  $[0^\circ, 360^\circ]$ . To obtain a tractable color palette, the continuous Hue channel is quantized into perceptually relevant intervals following the approach of Chang et al. [20]. This quantization reduces data complexity and enables clustering of dominant clay hues into a palette.

## 2.2. Phase 2: Creative decomposition

The data collected from Phase 1 is decomposed into several distinct, visual layers. First, the abstracted teapot silhouette is isolated to function as the principal formal framework and the base compositional field for textile design. Second, primary structural elements such as the interface between body and lid, the base, handle, and spout are separated to establish secondary organizational units. Third, plant motifs like the bark of the pine tree, the stalks and leaves of bamboo, and the branches and flowers of the plum tree are taken out as separate graphic objects that retain their important features, such as the rough texture of the pine tree, the segmented linearity of the bamboo tree, and the delicate petal geometry of the plum blossom.

## 2.3. Phase 3: Andean textile Transferring

In the consequent step, the deconstructed layers are re-assembled according to the structural language of Andean textile geometry. The teapot silhouette was placed onto a base field inspired by Andean reticulation systems, which guide harmonious spatial arrangements derived from traditional fabric composition. Then, the structural parts of the teapot obtained in Phase 2 and its isolated motifs are positioned within the Andean geometric framework, which serves as a guiding grid for spatial organization, to make a new composition while preserving their distinctive characteristics. This process produces a unified design that faithfully integrates the original sculptural characteristics of the teapots with Andean textile geometry by creating patterns that respect both the source motifs and the structural principles of the receiving visual system.

### 2.3.1. Color adaptation and material coordination

The quantized HSV palette derived from the teapot is applied directly into the cloth design to preserve the original color properties of the clay. This technique allows to maintain the visual and material essence of the original work by using color to convey depth, texture, and the three-dimensional qualities of the sculptural elements. All

color assignments and applications are documented with conversion tables and technical notes to guarantee accuracy and reproducibility in the textile adaptation process.

### 3. Results and Discussion

#### 3.1. Sample selection and Technical Documentation

From the larger group of 250 Yixing teapots assembled for this research, one exceptional teapot from the Yixing Purple Clay Teapot Museum was selected for in-depth analysis. The teapot is called “Close friend” from the author He Min; this work was chosen for its representativeness and its clarity in portraying the “Three Friends of Winter” themes of pine, bamboo, and plum into a single sculpture, making it an exemplary case of the complete hybrid fusion process.

The image above shows basic formal aspects of the teapot: The pine bark texture of the handle was mostly done sculpting, which gave it a volumetric, grooved surface that feels rough and looks heavy. The spout, fashioned from a bamboo stalk through carving and sculpting, exhibits a segmented, linear form that conveys structural clarity and rhythm. The plum flowers that radiate from the handle toward the body were made using both sculpting and clay painting. This created delicate low-relief shapes that keep the delicacy and detail of each petal.

These technical choices are not merely decorative; they are a direct translation of abstract symbolic ideals into concrete forms. The pine’s roughness shows strength, the bamboo’s straight lines show resilience and flexibility, and the delicate plum flowers show hope and rejuvenation in the face of hardship. The teapot functions as a conceptual object, enabling the user to interact visually and tactilely with a profound cultural story.

##### 3.1.1. Results from phase 1: Formal- Technical analysis

The analytical procedure applied to the selected ‘Three Friends’ teapot described a preliminary silhouette characterized by a robust organic profile and a quantized palette dominated by warm, muted clay tones (quantized hue bins corresponding primarily to ranges 0 and 5). Saturation and value analyses confirmed mid-range saturation and a broad value distribution, characteristics that inform subsequent chromatic adaptation.



**Figure 4.** Analytical Procedure applied to the selected teapot.

Meanwhile, the silhouettes in Figure 5 shows how the utilitarian vessel fits in with natural shapes, with the pine stem as the body and the branches as the spout and handle. This abstract form provides the foundational geometric framework for the subsequent textile design.



**Figure 5.** Visual layers of silhouettes of the selected teapot.

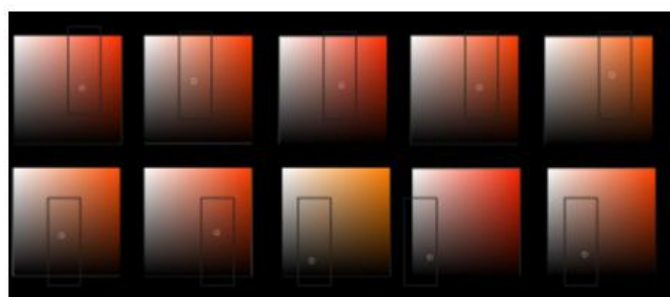
After finalizing the silhouette extraction, the teapot's picture is broken down into its Hue, Saturation, and Value channels. It can be seen in how Figure 6 these perceptual parts work together. The Value (V) channel has a grayscale map that shows the texture of sculpted plum and the way light and shadow change the volume of the surface.



**Figure 6.** Perception of color space.

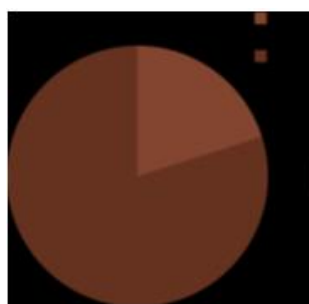
### 3.1.2. Quantization of color and dominant palette

The quantitative examination of 10 color samples obtained from the teapot indicated a well-defined color identity. The results of HSV decomposition and chromatic quantization following the principles of Chang et al. [20] can be seen in Figure 7.



**Figure 7.** Quantization of color and dominant Palette.

As for hue Distribution (Figure 8), Red-purple tones ( $h=0$ , 80%) are the most common, followed by orange-brown tones ( $h=1$ , 20%).

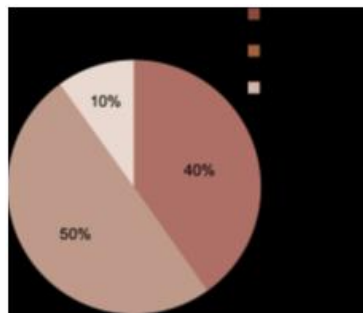


**Figure 8.** Hue Distribution.

For the saturation Distribution, as can be seen in Figure 9, is composed of mostly medium saturation (60%) colors, which is what gives clay its earthy look.

**Figure 9.** Saturation distribution.

For value Distribution, Figure 10 shows that the values are mostly in the middle (50%) and low (40%) ranges, which correlates with the depth and opacity of the material.



**Figure 10.** Value distribution.

Based on these findings, a final quantized color palette was created by averaging the S and V components of the dominating H groups. This was calculated by using the following standard formula: H (Hue) in degrees [0.360], S (Saturation) and V (Value) in percentage [0.100%]. The quantizer H was applied according to Chang et al. [20]. The resulting color palette, in turn, exhibits the basic colors of Yixing ceramics.

**Table 2.** Components of the dominant H group.

| Sample | Hexadecimal | RGB           | HSV             | H |
|--------|-------------|---------------|-----------------|---|
|        | #93624f     | (147, 98, 79) | (17°, 46%, 58%) | 0 |
|        | #a6623e     | (166, 98, 62) | (21°, 63%, 65%) | 1 |
|        | #8d4a3c     | (141, 74, 60) | (10°, 58%, 55%) | 0 |
|        | #854230     | (133, 66, 48) | (13°, 64%, 52%) | 0 |
|        | #844530     | (132, 69, 48) | (15°, 64%, 52%) | 0 |
|        | #5f4335     | (95, 67, 53)  | (20°, 44%, 37%) | 0 |
|        | #663220     | (102, 50, 32) | (15°, 69%, 40%) | 0 |
|        | #241f1a     | (36, 31, 26)  | (31°, 28%, 14%) | 1 |
|        | #2e2827     | (46, 40, 39)  | (9°, 15%, 18%)  | 0 |
|        | #342722     | (52, 39, 34)  | (17°, 35%, 20%) | 0 |

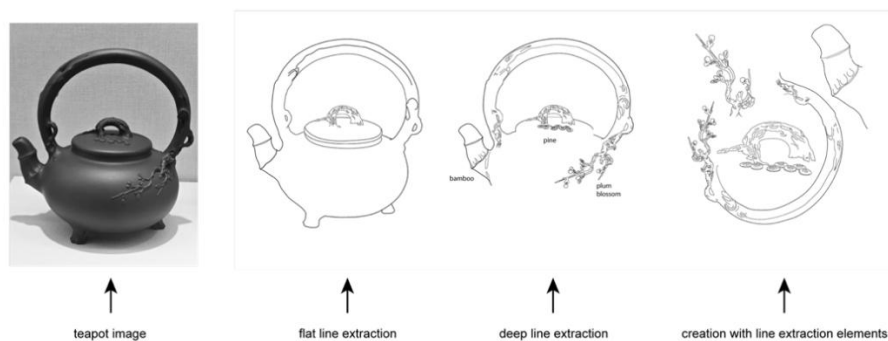
### 3.2. Results from creative decomposition

The deconstruction process separates the unified sculptural form into discrete design elements across three analytical layers:

Layer 1: Primary Structure. This foundational layer is derived from the vector silhouette of the teapot, establishing the definitive boundaries and overall contour that frame the subsequent textile design.

Layer 2: Secondary Structure. This layer captures the key architectural lines within the form. By posterizing the Value (V) channel of the HSV color model to two levels, the process highlighted essential linear features, such as the central axis of the pine stem and the directional flow of the branch-formed spout and handle.

Layer 3: Isolated Motifs. This final layer isolates the specific symbolic motifs. The grooved texture of the pine bark, the segmented lines of the bamboo, and the radial shapes of the plum blossoms were manually extracted and vectorized. These elements were converted into discrete graphic entities, preserving their fundamental character.

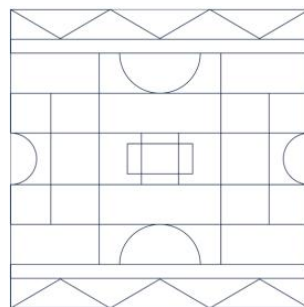


**Figure 11.** Results: Creative decomposition of the selected teapot.

### 3.3. Results: Recomposition based on Andean lexicon

The subsequent transposition of these elements required compliance with the structural logic of Andean cosmovision, the target cultural framework for the textile design. As previously noted, Andean spatial organization is rooted in a mathematical conception where the square serves as the primary metaphysical module and the modular grid operates as the fundamental organizing principle [14]. From Durand's analysis of Andean structural characteristics, this study applies three key principles: First, Quadripartition: the fourfold division underlying Andean cyclicity, as seen in "four seasons, four agricultural cycles" [14]. Second, Harmonic Bipartition: the division of a square into halves and diagonals to establish the foundational upper-lower (hanan-urin) structure [14]. Third, Tripartition: the recognition of tripartite divisions within Andean territory and temporal frameworks [14].

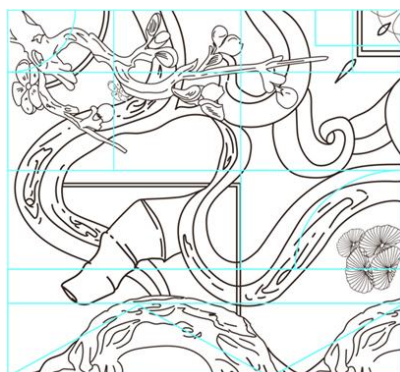
Guided by these principles, the design grid shown below was developed:



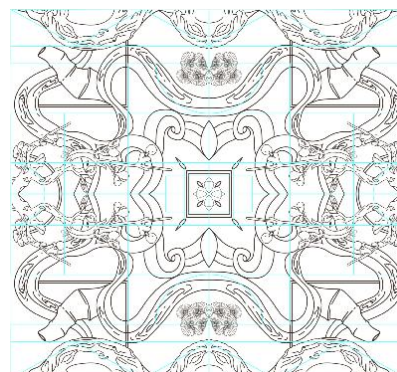
**Figure 12.** Geometric grid of composition based on Andean cosmovision.

### 3.3.1. A framework for cross-cultural composition

This stage of the process addresses the challenge of integrating multiple, complex forms without resorting to visual reduction. The theoretical foundation is provided by Durand's [14] concept of accumulative meaning in Andean iconography. Operationally, the intricate pine, bamboo, and plum motifs were woven into the grid using the relational principle of yanantin [21], which provided a structural logic for their coexistence. This resulted in a saturated composition that embodies the Andean aesthetic valuation of duality and plenitude over minimalist isolation [22].



**Figure 13.** Adaptation of motifs into grid.



**Figure 14.** Complete scheme applied of motifs and grid.

The HSV-derived color palette serves as a tool for making the two-dimensional geometric structure seem three-dimensional. The value distribution, which is mostly medium (50%) and low (40%), is used deliberately to generate visual depth. The hue concentrations, on the other hand, keep the material's authenticity while keeping the structure in harmony.

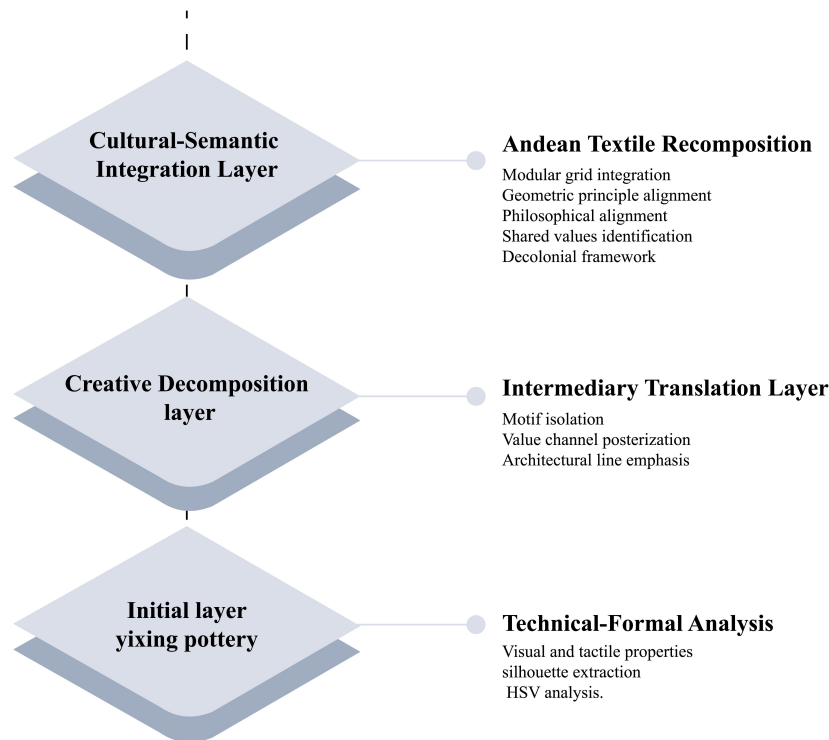


**Figure 15.** Applied motifs and color combination on fabric.

The entire synthesis shows Yixing teapot patterns were successfully used in Andean textile design. By following structural organization using a modular grid based on Andean geometric principles, the integration of complex botanical motifs without simplification was achieved. At the same time, the chromatic adaptation kept the design authentic to reflect the material of the original teapot while following Andean dye traditions, which create visual depth through strategic value distribution. This case study shows the potential of the use of hybrid fusion technique in cross-cultural design. It not only showcases its ability to connect dissimilar cultural traditions but does it while maintaining the symbolic and aesthetic integrity of both cultural systems.

### 3.4. Discussion

The three-phase methodology implemented in this study operates simultaneously across multiple strata of cultural meaning, creating what might be termed a “vertical integration” between technical process and symbolic depth. Rather than a linear sequence, the phases engage different layers of cultural understanding.



*Figure 16. Layers of implemented methodology.*

The Technical-Formal Analysis of phase 1 functions at the initial layer, systematically documenting visual and tactile properties through silhouette extraction and HSV analysis. This phase establishes an empirical foundation that moves beyond subjective interpretation, providing reproducible data for intercultural translation. The process then advances to the Creative Decomposition phase, which operates at the Intermediary Translation Layer, disassembling the unified sculptural form into discrete design elements while preserving their essential characteristics. This stage bridges the dimensional gap between pottery and textiles, transforming three-dimensional volumes into two-dimensional compositional components ready for recontextualization. Lastly and most significantly, Andean Textile Recomposition engages the Cultural-Semantic Integration Layer. By integrating motifs through principles of yanantin and quadripartition, this phase facilitates a philosophical dialogue between the resilience embodied in the “Three Friends of Winter” and the complementary worldview of Andean cosmology.

The geometric framework reshapes the motifs into a new and renewed cultural logic. Together, these phases show how culturally grounded visual translation can unfold in practice while demonstrating how the hybrid fusion process as an interdisciplinary tool capable of negotiating meaning across distinct artistic and philosophical traditions. This construction approach challenges conventional cross-cultural design practices that often prioritize visual similarity over conceptual depth, showing instead that meaningful interdisciplinary work emerges through structured engagement with the conceptual foundations of both source and receiving cultures.

## 4. Conclusions

This research demonstrates that the hybrid fusion methodology developed in this study offers a rigorous and culturally sensitive framework for translating visual and symbolic knowledge across craft traditions. By integrating Technical-Formal Analysis, Creative Decomposition, and Andean Textile Recomposition into a vertically aligned process, the study shows how design can operate simultaneously across empirical, translational, and cultural-semantic layers. This multilevel structure enabled the “Three Friends of Winter” motif, which is rooted in Yixing’s sculptural philosophy, to be reinterpreted within the Andean principles of *yanantin* and quadripartition without reducing its symbolic integrity.

The primary contribution of this work is methodological. Moving beyond stylistic borrowing or superficial aesthetic fusion, the approach engages directly with the conceptual foundations of each cultural system. By combining digital analytical tools, such as HSV value extraction, with culturally grounded geometric recomposition, the methodology demonstrates how three-dimensional sculptural logic can be coherently reconfigured within a two-dimensional textile framework. Consequently, it positions the designer not merely as a maker, but as a cultural mediator capable of negotiating meaning across distant artistic and philosophical traditions.

Furthermore, this study illustrates the broader potential of hybrid fusion as an interdisciplinary design tool. The vertical integration model can be adapted to other craft pairings, cultural dialogues, or material practices particularly those seeking to balance analytical rigor with cultural sensitivity. Future research could explore reciprocal translation processes, such as transposing Andean textile cosmology back into Yixing pottery forms or extend the methodology to additional heritage crafts to test its scalability. Incorporating user perception studies or participatory co-design approaches could also yield deeper insights into how these translated motifs are received and interpreted within their respective cultural contexts.

Ultimately, this research advocates for a design practice that moves beyond decorative appropriation toward a form of intercultural engagement grounded in respect, methodology, and philosophical depth. By demonstrating how cultural symbols can be reconstituted through structured, reflective processes, it contributes to a more equitable landscape of global design, that is, one in which cultural exchange becomes an act of knowledge-building rather than consumption.

## Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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