

The Number of Motif Units on Painted Pottery during the Chalcolithic Period in the Kur River Basin, Fars Province, Iran

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Introduction

The Chalcolithic period in the Kur River Basin, Fars Province, southwestern Iran, is called the Bakun period (ca. 5000–4000 BCE). In this cultural period, potteresses and potters produced beautifully painted pottery featuring humans and natural motifs different from those of the former Neolithic period, such as the Mushki (ca. 6300–6100 BCE), Bashi (ca. 6100–6000 BCE), and Jari periods (ca. 6000–5500 BCE) in the Fars province. These Neolithic painted ceramics were characterized by simple geometric motifs. In contrast, the black-on-buff fine wares of the Bakun period were produced using high-temperature facilities, such as pottery kilns, and represent a new pottery production technology from Mesopotamia and Khuzestan (Alizadeh 2006; Mutin 2012; Weeks et al. 2010). From a broader point of view, this period is contemporaneous to the Ubaid period in Mesopotamia, the Middle-Late Susiana period in Khuzestan, and the Transitional Chalcolithic in the Iranian Central Plateau (Carter and Philip 2010; Delougaz and Kantor 2008; Vidale et al. 2018). Many previous studies argued for the increase in social complexity and craft specialization during the Bakun period (Alizadeh 2006; Fraser 2008; Sumner 1994) and its painted pottery and production are an important component for discussion of these topics. In this short paper, I review the previous studies on the Bakun pottery and its painted decoration, and highlight the attention given to the number or frequency

of motif units. Then, I conduct analyses of the number of motif units and consider their relevance to the pottery-making communities.

Bakun pottery and painted decoration

The pottery attributes of Bakun pottery, such as wares (Alizadeh 2006; Egami and Masuda 1962), vessel forms (Alizadeh 2006; Egami and Masuda 1962; Egami and Sono 1962; Goff 1963; Herzfeld 1932; Langsdorff and McCown 1942), vessel volumes (Pollock 2010; 2012), and pottery production technologies (Bernbeck et al. 2005; Egami and Masuda 1962; Egami and Sono 1962; Helwing and Seyedin 2010; Langsdorff and McCown 1942; Marghussian et al. 2009), were extensively described and studied in the publications of excavated ceramic materials. Vessel forms were given special attention in order to construct chronological subdivisions of the Bakun period (Voigt and Dyson 1992) and to discuss the daily practices of food consumption (Pollock 2012). Pottery production technologies were also addressed in studies on pottery kilns to clarify production location and the organization of production (Alizadeh 1988; Bernbeck et al. 2005; Fraser 2008; Helwing and Seyedin 2010; Langsdorff and McCown 1942).

Of all the pottery attributes, the painted decoration – which was visibly distinguishable and highly variable – was intensively studied by previous researchers. Until the 1990s, the painted decoration was used as a chronological marker to subdivide the chronology of the

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Bakun period (Dittmann 1986; Egami and Sono 1962; Langsdorff and McCown 1942; Voigt and Dyson 1992). The absence of one well-preserved site with a continuous stratigraphy from the beginning to the end of the Bakun period was the main reason researchers used the painted decoration as a chronological marker. Three type-sites (Tall-e Bakun B Level BII, Tall-e Gap, and Tall-e Bakun A) were defined as representing the tripartite chronological subdivision (the Early, Middle, and Late Bakun phases). Chronological attributions and diachronic analyses of settlement patterns, plus the need to publish research on newly excavated sites, drove the study of painted decoration on pottery vessels.

With the increasing number of radiocarbon dates from recent and old excavations (Alizadeh 2006; Miki 2013; 2014; Weeks et al. 2010), studies of the Bakun painted decoration gradually shifted from chronological studies to the investigation of sociocultural aspects of the Bakun period. The symbolic meaning of painted decoration, especially human motifs, has recently been given more attention, although their meaning itself was debated for a long time (Alizadeh 2006; Herzfeld 1941; Langsdorff and McCown 1942). Yosef Garfinkel argued that some human motifs and diamond motifs represented dancing scenes to mitigate social tension (Garfinkel 2003). Susan Pollock also interpreted the appearance of animal and human decorations on pots as “*an attempt to categorize the natural world as a means to control or possess it*” (2015, 58). In addition, she argued that naturalistic portrayals during the Bakun period point to the appearance of representation, or of “*separating depictions of living beings from their actual living existence*” which means the “*categorization of what were continually changing beings into stable, fixed representations*” (Pollock 2015, 59–60). In these studies, human and animal motifs were interpreted as symbols.

On the other hand, the design configuration, or the horizontal design structures of

the painted decoration, which delimit the design panels and were not always consciously recognized by consumers of the pottery and researchers (Bernbeck 1999), have been less studied. Alizadeh (2006) analyzed the horizontal design structures on the exterior of painted vessels calling them “banding patterns” and described them as two pairs of thick bands and several thin lines above and below the design panel. He classified the banding arrangements into 19 types and identified these types in six vessel forms. He contended that hidden or implicit rules were shared among members of the community of pottery producers at Tall-e Bakun A. In addition, by analyzing the degree of adherence to these rules, the character of the community could be indirectly established. The number of motif units, that is, how many times the same motifs were repeated is also part of the design configuration and has never been studied for the Bakun period. This method of counting the number of motif units has been successfully applied by Japanese archaeologists to the study of the Jomon pottery. Kimio Suzuki (1970) nicely demonstrated that the number of motif units was strictly shared in the specific phases of the Jomon period, showing the utility of the analysis of the number of motif units.

New approaches to the painted decoration of the Bakun pottery

The painted decoration of the Bakun period was mainly used as either a chronological marker or interpreted as a symbol. However, the design configurations, such as horizontal design structures and the number of motif units or the diachronic changes of the design configurations, have not been thoroughly studied. The problem lies in the paucity of complete vessels with whole circumferences and the difficulty of estimating the number of motif units. Therefore, the purpose of this paper is to analyze the number of motif units in the Bakun period using both complete and diagnostic vessels with whole circumferences and those available in published drawings.

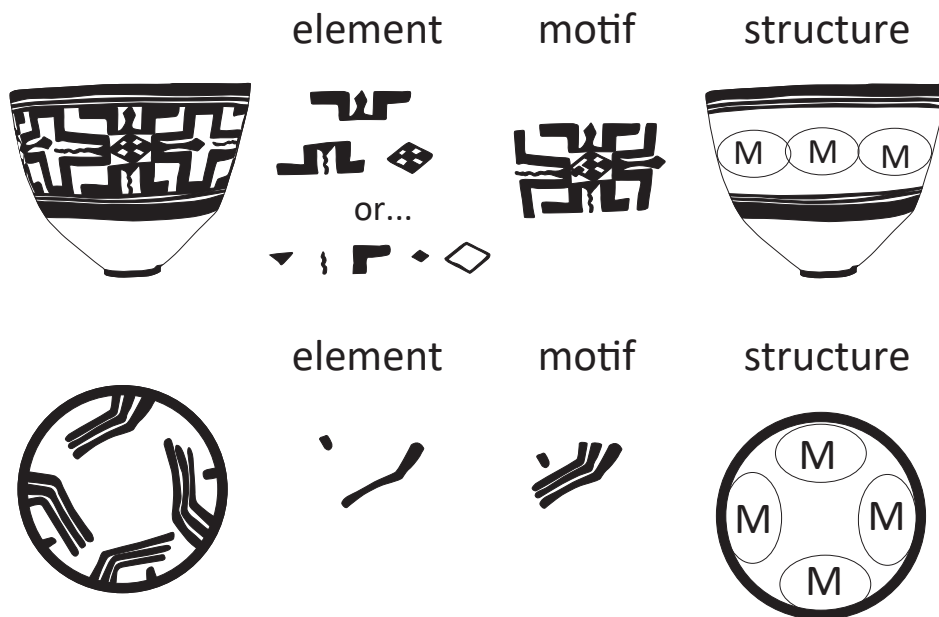


Fig. 1. Element, motif, and structure of the Bakun painted pottery. Traced from Langsdorff and McCown 1942, Pl. 4, 3; Egami and Sono 1962, Fig. 30, 4; digitizing: T. Miki.

The specific research questions are as follows:

- 1) What is the number of motif units shared among the Bakun period sites?
- 2) Is there any diachronic change in the number of motif units?
- 3) Are some specific motifs/vessel forms related to specific numbers of motif units?

Methods

Before explaining the method of analyzing the number of motif units, following Prudence Rice (1987), I will define the terminology of painted decoration. First, an element is the smallest component of a motif. In the examples of the Bakun painted pottery, the elements include a single dot, a single short vertical line, a triangle, a rectangle, a lozenge, etc. (Fig. 1). Second, a motif is a specific pattern of the combinations of elements. During the Bakun period, the same motif is repeatedly configured several times in one piece of pottery (Fig. 1). A motif unit refers to one unit of two to three combinations of motifs repeated several times in one vessel. Third, a horizontal design structure is a spatial pattern

where motifs are bounded (Fig. 1). This structure consists of horizontal bands, lines, and friezes in which motif units are repeated. In general, understanding a horizontal design structure is more challenging to identify than that of an element or a motif due to the scarcity of complete vessels.

Next, I will explain the counting and estimating methods of motif units in both well-preserved vessels with whole circumferences and published drawings that present one side of the ceramic materials. In well-preserved vessels with whole circumferences, I counted directly the number of motif units. In potsherds or published drawings that present one side of the ceramic materials, I first measured the angle of the arc that one motif unit occupied within the circumference (Fig. 2). Subsequently, I divided 360° (the angle of the whole circumference) by this angle, to calculate the estimated number of motif units. Please note that this estimate is a very rough method that assumes that the width of each motif unit is the same in the vessel and that the vessel's circumference is circular.

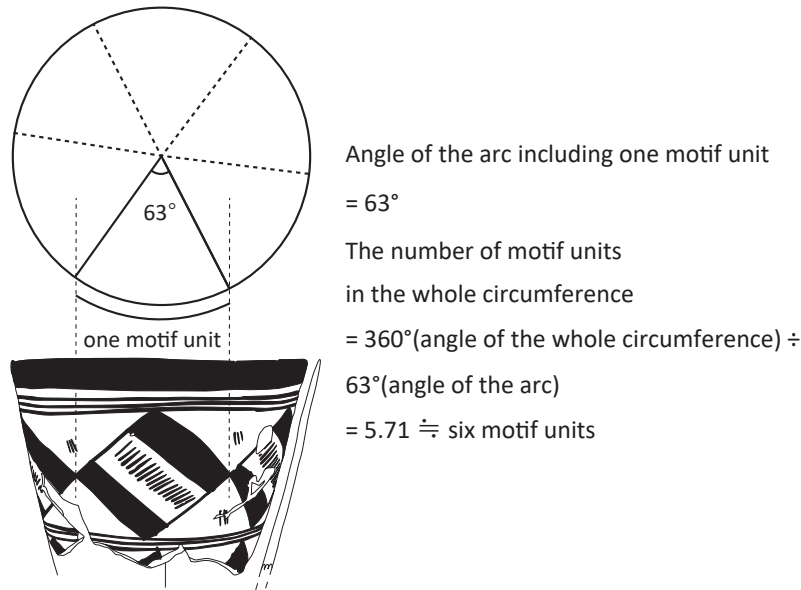


Fig. 2. The method of estimating the number of motif units. Drawing and digitizing: T. Miki.

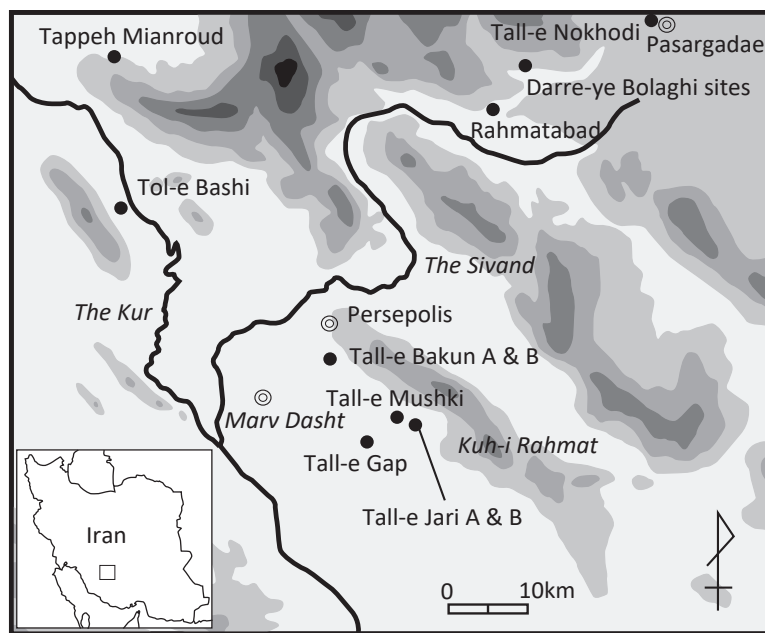


Fig. 3. Map of the Kur River Basin, the archaeological sites (black dots) belonging to the Bakun period, and other locations (double circle). Digitizing: T. Miki.

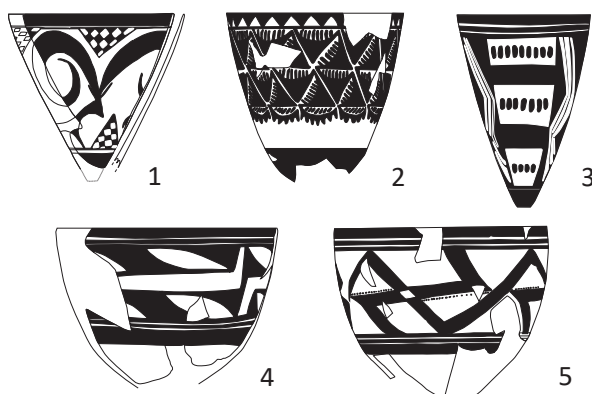
Materials

I used the ceramic materials excavated at Tall-e Jari A, Tall-e Gap, and Tall-e Bakun A, located in the Kur River Basin, Fars province, southwestern Iran, each belonging to a different subphase of the Bakun period (Fig. 3). Below, I give the basic information

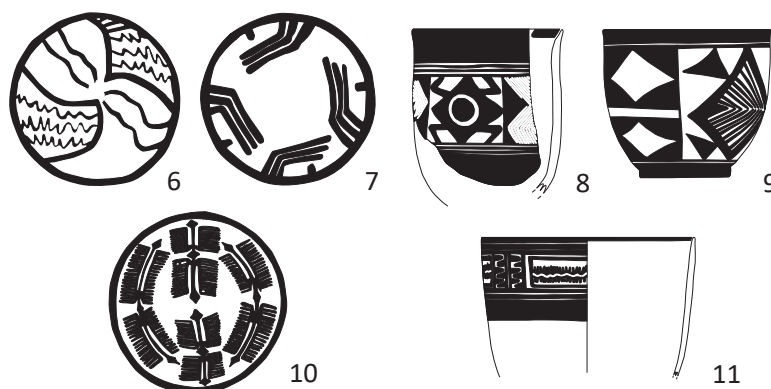
about these three sites, such as excavation history, site size, period, absolute dates, number of ceramic materials used for the analysis, and their characteristic motifs.

Tall-e Jari A is a circular tell site. The height of this site is 2.5 m, and the diameter is about 100 m. Since the 1950s, Louis

Tall-e Bakun A (ca. 4500–4300 BCE)



Tall-e Gap (ca. 4700–4500 BCE)



Tall-e Jari A (ca. 5000 BCE)

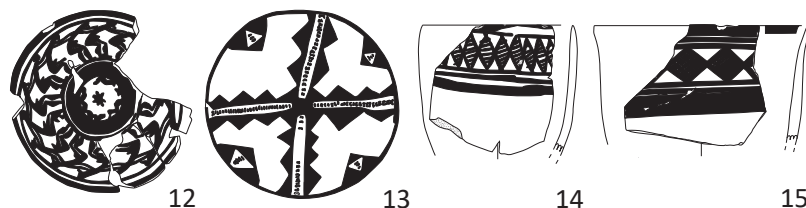


Fig. 4. The Bakun pottery from Tall-e Bakun A (1-5), Tall-e Gap (6-11), and Tall-e Jari A (12-15) (not to scale). 1-13: traced from Herzfeld 1932, Tafel II, 1; Langsdorff and McCown 1942, Pls. 26, 8, 36, 13, 65, 9; Alizadeh 2006 Fig. 25, D; Egami and Sono 1962 Figs. 12, 6, 13, 3, 23, 1, 28, 1, 30, 4, 31, 4; Vanden Berghe 1952 Pl. LIX-L; Egami et al. 1977 Pl. III, 1. Digitizing: T. Miki.

Vanden Berghe, Namio Egami, Seiichi Masuda, and Abbas Alizadeh conducted excavations at Tall-e Jari A (Alizadeh 2006; Alizadeh et al. 2004; Egami 1967; Egami et al. 1977; Vanden Berghe 1952). The uppermost level includes Bakun painted pottery. One radiocarbon date of this level dates to ca. 5000 BCE (Miki 2014). I used one well-preserved vessel (Fig. 4, 13) for the direct counting and seven ceramic sherds for the estimate. The Bakun painted pottery was very rare at Tall-e Jari A. Several nearly

complete vessels were found as burial goods (Fig. 4, 12-13). In interior-painted vessels, human motifs were depicted inside the frieze (Fig. 4, 12). On the other hand, in exterior-painted vessels, cross-hatched diamond motifs were present only on the upper body part (Fig. 4, 14-15).

Tall-e Gap is a mound of approximately 5 m height and 120 m in diameter. After Vanden Berghe conducted soundings at this site (Vanden Berghe 1952), Namio Egami and

Toshihiko Sono excavated it in 1959 (Egami and Sono 1962). The stratigraphy of Tall-e Gap was subdivided into 20 levels. The radiocarbon dates collected from Tall-e Gap ranged from 4700 to 4500 BCE (Miki 2013). From the upper half of the levels at Tall-e Gap, the frieze of exterior-painted vessels expanded to the whole surface from the rim to the base (Fig. 4, 8–9). More varieties of motif-types appeared at Tall-e Gap than at Tall-e Jari A (Fig. 4, 6–11). In addition, the size of one motif unit became larger (Fig. 4, 9). Thirteen well-preserved interior-painted vessels were used to identify the number of motif units. Fifty diagnostic sherds with drawings were used to estimate the number of motif units.

Tall-e Bakun A is approximately 150 m long and 120 m wide, and 5 m high. After the initial excavation in 1928 by Ernst Herzfeld (1932), in 1932 and 1937 Alexander Langsdorff and Donald E. McCown (1942) conducted a large-scale excavation. At present, a large portion of well-preserved vessels with whole circumferences unearthed by excavations are kept at the Oriental Institute of the University of Chicago. In 1956, Egami and Masuda (1962) from the University of Tokyo Iraq-Iran expedition conducted a small-scale sounding in the southwestern part of Tall-e Bakun A. In 2004, Alizadeh also conducted small soundings at Tall-e Bakun A and collected samples for radiocarbon dating (Alizadeh et al. 2004); these range from 4500 to 4300 BCE. The motifs became much more complex and elaborate than those at the sites discussed above (Fig. 4, 1–2). The common motifs were “zigzags and boxes” (Fig. 4, 3), “white leaves” (Fig. 4, 4), and “windmills” (Fig. 4, 5). In addition to these new painted decoration, also new vessel forms appeared at Tall-e Bakun A, such as a conical bowl painted on the exterior (Fig. 4, 1), which required a different painting strategy from the other exterior-painted vessels. I analyzed 40 well-preserved vessels (45 motif-unit samples) kept at the Oriental Institute of the University of Chicago to identify the number of motif-units. In

addition, 17 diagnostic sherds, such as conical base sherds, and 31 published drawings were included to count directly the number of motif units. Other than these 93 analyzed specimens for direct counting the number of motif units, 81 published potsherds were used for the estimate.

Results

Number of motif units counted directly from well-preserved vessels

As a result of the direct counting of well-preserved vessels, at first, it turned out that the most common number of motif units was three in both exterior-painted vessels and interior-painted ones at Tall-e Bakun A (Tab. 1). Second, the number of motif units of exterior-painted vessels ranged from two to 13 at Tall-e Bakun A. In contrast to this, well-preserved vessels from Tall-e Gap and Tall-e Jari A whose number of motif units was discernible, were limited. In interior-painted complete vessels at Tall-e Gap, two and four motif units were preferred, showing different patterns from the interior-painted ones from Tall-e Bakun A. A combination of wavy lines and triangles was preferred in two motif units at Tall-e Gap (Fig. 4, 6). The only interior-painted complete vessel found at Tall-e Jari A presented four motif units (Fig. 4, 13).

The forms of exterior-painted vessels from Tall-e Bakun A were further analyzed to search for their correlations with two and three motif units (Fig. 5). About 75% of the exterior-painted vessels with two motif units were conical bowls. There were also correlations between motif types and numbers of motif units. For example, in many cases the vessels with two motif units had the goat motifs (Fig. 4, 1). As for vessels with three motif units from Tall-e Bakun A, conical bowls were also common, followed by large jars, deep bowls, funnel-shaped vessels, and beakers. It is possible that on conical bowls it was easy to paint two or

Number of motif units counted from well-preserved vessels	2	3	4	5	6	7	8	9	10	11	13
	exterior-painted vessels										
Tall-e Bakun A (ca. 4500–4300 BCE) (N=73)	22	34	2	3	1	3	1	2	1	2	2
interior-painted vessels											
Tall-e Bakun A (ca. 4500–4300 BCE) (N=20)	5	13	1	0	1	0	0	0	0	0	0
Tall-e Gap (ca. 4700–4500 BCE) (N=13)	6	1	6	0	0	0	0	0	0	0	0
Tall-e Jari A (ca. 5000 BCE) (N=1)	0	0	1	0	0	0	0	0	0	0	0

Tab. 1. Number of motif units directly counted from well-preserved vessels with whole circumferences from Tall-e Bakun A, Tall-e Gap, and Tall-e Jari A.

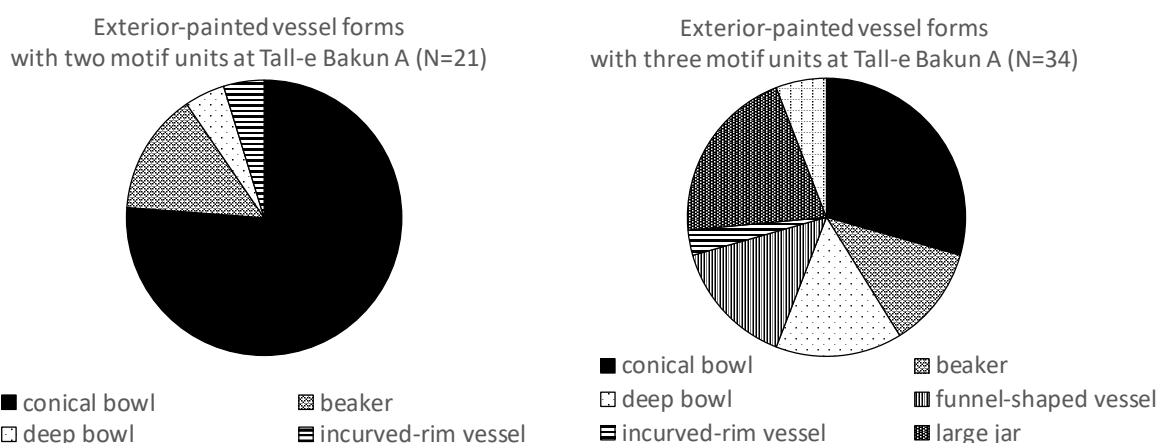


Fig. 5. Pie charts of vessel forms of the exterior-painted vessels with two motif units (left) and three motif units (right) at Tall-e Bakun A.

three motifs in a symmetrical manner. In addition, motif units numbering more than nine appeared only on a deep bowl and a beaker. The vessels with many motif units usually had diamond motifs.

Number of motif units estimated from drawings

Most of the estimated numbers of exterior-painted vessels at Tall-e Jari A had more than 13 motif units (14, 20, and 42 motif units;

Tab. 2). The common estimated numbers of motif units on the exterior-painted vessels at Tall-e Gap were four, seven, and ten motif units. There were eight cases of numbers of motif units greater than ten. The exterior-painted motifs on the vessels with more than four motif units were generally cross-hatched diamonds, rectangles, and triangles. Finally, the common estimated numbers of motif units on exterior-painted vessels at Tall-e Bakun A were three, four, and six. The

Number of motif units estimated from drawings	2	3	4	5	6	7	8	9	10	11	12	13	> 13
exterior-painted vessels													
Tall-e Bakun A (ca. 4500–4300 BCE) (N=80)	2	12	14	2	11	8	9	4	4	1	6	1	6
Tall-e Gap (ca. 4700–4500 BCE) (N=44)	1	4	6	1	4	6	10	1	3	2	3	0	3
Tall-e Jari A (ca. 5000 BCE) (N=4)	0	0	0	0	0	0	0	0	0	0	1	0	3
interior-painted vessels													
Tall-e Bakun A (ca. 4500–4300 BCE) (N=1)	0	0	0	0	0	1	0	0	0	0	0	0	0
Tall-e Gap (ca. 4700–4500 BCE) (N=6)	0	1	3	1	1	0	0	0	0	0	0	0	0
Tall-e Jari A (ca. 5000 BCE)(N=3)	0	0	0	0	0	0	1	0	0	0	1	0	1

Tab. 2. Number of motif units estimated from published drawings from Tall-e Bakun A, Tall-e Gap, and Tall-e Jari A.

paucity of the samples with two motif units in the estimated numbers can be because vessels with two motif units had already been directly counted from well-preserved vessels. Vessels with more than ten motif units are also present at Tall-e Bakun A.

As for the estimated number of motif units on the interior-painted vessels, more than seven motif units were common at Tall-e Jari A. A variety of motif units inside the horizontal frieze were frequent, including humans. On the other hand, at Tall-e Gap the most frequent estimated number of motif units on the interior-painted vessels was four. The hanged vertical or diagonal lines were common in the interior-painted decoration with four motif units at Tall-e Gap (**Fig. 4**, 7).

Discussion: Diachronic change in the number of motif units

For exterior-painted vessels, the limited samples from Tall-e Jari A showed large

numbers of simple motif units (more than 13 motif units). On the other hand, the preferred numbers of motif units became gradually smaller at Tall-e Gap (four, six, and eight motif units). Finally, at Tall-e Bakun A, the number of preferred motif units continued to decrease, and two and three motif units were preferred, suggesting that: 1) the size of one motif unit became larger over time, and 2) repeating the same motif unit in one vessel was gradually avoided. When painters simply repeated small motifs (e.g., cross-hatched diamonds at Tall-e Jari A), the number of motif units was not a matter of concern. I have inferred that in the process of reducing the number of motif units and generating larger-sized elaborate motifs, adherence to painting a specific number of motif units for a specific motif and vessel form (such as two motif units for a “goat with big horn” and conical bowl; **Fig. 4**, 1) came to be shared among the communities of potteresses and potters at the final stage of the Bakun period.

As for interior-painted vessels, although many simple motif units were repeated at Tall-e Jari A, the interior-painted ones at Tall-e Gap showed two and four motif units and those at Tall-e Bakun A showed two and three motif units. In contrast to the exterior side of vessels, the entire interior surface of the vessels can be seen by painters. Hence, it would be easier to evenly distribute paint motif in interior surfaces than exterior surfaces. After the decrease in the use of interior-concentric lines on the interior-painted vessels (**Fig. 4, 12**), which were common at Tall-e Jari A, the size of one motif unit became larger, and the number of motif units decreased over time. By the middle or late Bakun phase, three and four number of motifs were in use at Tall-e Gap and Tall-e Bakun A. This suggests that motif size drove the specific number of motif units on each vessel, becoming a rule that the community of painters followed.

Concluding remarks

In this paper, I focused on the number or frequency of motif units repeated on the surface of Bakun pottery with the aim of addressing three research questions. As for the first question, specific numbers of motif units were shared among the analyzed sites: two and three motif units on interior- and exterior-painted vessels at Tall-e Bakun A, and two and four motif units on interior-painted vessels at Tall-e Gap. As for the second question, there was long-term change from the painting of many motif units at Tall-e Jari A to painting fewer motif units at Tall-e Bakun A, driven by the use of larger motifs and the change in horizontal design structures. As for the third question, at Tall-e Bakun A, correlations were found among motif units, motif types, and vessel forms, implying the sharing of a decorative rule among the community of painters.

Notwithstanding these results, there are some limits in the analyses presented in

this paper. First, the method of estimating the number of motif units could be improved. The ceramic vessels do not always form circular circumferences, and each motif-unit does not always occupy the same width evenly. Second, in analyzing complete vessels, not only the number of motif units but also the ratio of each motif unit to the whole circumference should be measured. For instance, Ken'ichi Kobayashi nicely showed the patterns of the ratio of motif units (e.g., neatly assigned, unevenly assigned, narrowly assigned only at the last motif-unit) in studies on the Jomon pottery (Kobayashi 2000). Such a perspective would contribute to further the understanding of skill differences, the painting sequence of motif units (from left to right or not), and the method of assigning motif units (use of rotational devices, marking by pigments, or the *ad-hoc* repetition of motif-units without any rule).

In conclusion, studying the number of motif units has potential in future studies. For example, the regional comparison of the number of motif units in Fars with those in Khuzestan could reveal regional differences in the explicit rules of painting. The number of motif units, which was not given attention before, can be a good marker for identifying communities of practice.

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