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EMULATION IN PAINTED POTTERY STYLES IN EGYPT IN THE PREHISTORIC PERIOD

Abstract: This study examines how the painting technique was introduced into the pottery assemblages of Egypt and Nubia in the prehistoric period. For this purpose, I compare the introduction process of the painting technique in Egypt from the fifth to the first half of the fourth millennium BCE and that in Upper Mesopotamia between ca. 6200-5900 cal BC to establish if they had a similar introduction process or not. If they were different, I tried to clarify how exactly the case of Egypt was different from that of Upper Mesopotamia. This study suggests the possibility that white cross-lined ware (C-ware), and probably also black incised ware (N-ware), were the kinds of ware vessels invented locally in Upper Egypt in the process of introducing the inlay decoration technique using white pigment from the Nubian pottery traits (e.g., caliciform beakers) and introducing the painting decoration technique from the southern Levant, though the painting was made mostly with a reddish pigment in the southern Levant instead of white. The pigment color used for the painting decoration on pottery surfaces in Upper Egypt might have been changed from white (i.e., C-ware) to reddish (i.e., D-ware) even for the purpose of finding more efficient (i.e., less labour-intensive) decoration techniques.

Keywords: emulation; color pigment; Egypt; Upper Mesopotamia

Introduction

Before comparing the introduction process of the painting technique into pottery production in Egypt and that in Upper Mesopotamia, I would like to discuss the introduction process of painting techniques into pottery production in each of the regions and what kinds of pottery vessels with decorations made with color pigments appeared in pottery assemblages in each region during the introduction period of painting techniques.

Painted pottery at Tell Sabi Abyad in Upper Mesopotamia during *ca*. 6200-5900 cal BC

In the case of Upper Mesopotamia, coarse pottery became replaced with technologically advanced and stylistically elaborated Fine Ware in a remarkably short period of time between *ca*. 6200-5900 cal BC (Nieuwenhuyse 2009). This was due to an innovation in the firing technique. The period between *ca*. 6200-5900 cal BC when the ceramic change in technology, an increasingly complex morphology and decoration took place is known as the 'Transitional Period,' which occurred between Pre-Halaf and Early Halaf periods (e.g., Nieuwenhuyse 2009: Fig. 5, 2013: Fig. 11.1) (Pl. 1). After the Fine Ware pottery shifted from a 'prestige' technology to a 'practical' technology, the morphological innovation that was accompanied by improvements in tempering occurred as an alternative strategy for maintaining a degree of exclusive refinement of the Fine Ware pottery by elaborating on the vessel shape. Defined by the introduction and rapid spread of Fine Ware ceramics (e.g., Standard Fine Ware, Orange Fine Ware, and Fine Painted Ware) and an associated decline of Standard Ware, the ceramic assemblage changed beyond recognition (Akkermans 1989, 1993; Le Mière and Nieuwenhuyse 1996). This stage saw a dramatic spur in decorated ceramics, which jumped from about 20% of the assemblage at the start of the Transitional stage to about 80% or more during the Early Halaf (Pl. 1). What is more, all earlier approaches to decorating pottery vessels were abandoned in favor of just one technology, painting (Nieuwenhuyse 2007, 2009). O. Nieuwenhuyse (2009, 88) reports that the complexity in the design structure of decoration by the technique of painting is seen in the later stages of the Transitional Period after the morphological innovation as follows: first, subdividing the vessel surface by adding horizontal lines filled with smaller decoration patterns between

decoration zones, and second, enhancing the color contrast between the painted decoration and the surface background in order to facilitate the visual transmission of stylistic information of increasing scope during commensality events (Nieuwenhuyse 2017, 125). O. Nieuwenhuyse (2007, 2009, 2018, 380) named it the 'painted-pottery revolution.'

Painted pottery in Upper Egypt between Late Neolithic and Naqada IID1 periods

In Lower Egypt, clear examples showing paint decoration have not been found at any Neolithic sites. From Lower Egyptian sites in the first half of the fourth millennium BCE, a limited number of pottery vessels and sherds with red paint decoration have been known, apart for a few uncommon sherds with white paint decoration at Buto Ia (Faltings 1998a: 30-31; 1998b: 367; 1998c: 37) and only a few examples with blackish-brown or reddish-brown paint decoration at Maadi (Rizkana and Seeher 1987). The kinds of pottery vessels showing painting decorations by color pigment that appeared in pottery assemblages in Egypt in the Neolithic period and the first half of the fourth millennium BCE were described as follows:

<u>In the Late Neolithic period</u>
Pottery vessels showing decorations with color pigments in Egypt first appeared within the so-called 'caliciform beakers' (Pl. 2: 1-4), which have incised lines that are filled by white substance, among the pottery assemblages of the Tasian culture, the Badarian culture, and the Naqada culture in Upper Egypt (Petrie 1921; Brunton and Caton-Thompson 1928, 23, MS24, MS25; Brunton 1934). The Tasian culture is now generally regarded to have been a nomadic culture (Hendrickx and Vermeersch 2000, 40; Friedman and Hobbs 2002, 189), even though its dating remains uncertain. Conventional radiocarbon and AMS dating of the remains from Wadi Atulla, which is thought to have been one of the Tasian related sites, yielded calibrated dates of between 4940 and 4455 cal BC (5850 ± 50 BP and 5760 ± 70 BP uncalibrated) (Friedman and Hobbs 2002). South Kharga site KS043, which is considered to have been a Tasian-related site because of the presence of black topped ceramics and tulip beakers (i.e., caliciform beakers) (Briois et al. 2012), indicates a date from 5000 to 3950 cal BC (concentrated around 4600-4350 cal BC) (Wuttmann et al. 2012). Based on

relative dating results, the Badarian is estimated to have preceded the Predynastic period (the Naqadian) in Upper Egypt. Scarce radiocarbon dating results from Hemamieh confirm this estimation, and the Badarian is dated somewhere between 4400 and 4000 cal BC (Hassan 1985; Holmes and Friedman 1994). Regarding vessels with decorations made by color pigment in the Neolithic periods other than caliciform beakers, only a few vessels with red paint (Brunton and Caton-Thompson 1928, 23, MS16; Brunton 1948, 10, MS18[1]) and a few vessels with white paint[2] (Quibell 1904, no. 11501; Brunton and Caton-Thompson 1928, 23) have been noticed among the pottery assemblage of the Badarian culture. No vessels with decorations made of colored materials have been known at Neolithic sites in Lower Egypt. Throughout the subsequent culture in Upper Egypt, namely the Naqada culture, it is known that pottery vessels with various decorations appeared from its onset.

In Upper Egypt in the first half of the fourth millennium BCE

In the Naqada culture, the various classes of pottery, including his B-, P-, F-, C-, D-, R-, W-, N-, and L-wares, were defined by William Matthew Flinders Petrie (Petrie 1901, 1921) and they will be used from here on.[3] These wares are described by W. M. F. Petrie in his various publications (1901, 1921; Petrie and Quibell 1896) and have been discussed by others over the years (e.g., Baumgartel 1955; Friedman 1994).[4] However, I stress that I have chosen to use Petrie's C-ware, N-ware, and D-ware for a discussion focusing on the decorations made by color pigment. Each class appeared on the following timeline: C-ware (white cross-lined ware) appeared from Naqada I to Naqada IIA periods (Payne 1992; Hendrickx 1996, 2006), while N-ware (black incised ware) and D-ware (decorated ware) first appeared in Naqada IIA (Payne 1992; Hendrickx 1996, 2006).

The white cross-lined ware (C-ware) having a reddish-brown or dark red surface is coated with an ochre wash and is burnished. It is decorated with white gypsum paint applied before or after firing to Nile clay vessels (Arnold *et al.* 1993, 96; Droux and Friedman 2016). Geographically, white cross-lined pot-

1 Two examples are reported to have a yellowish-brown background with paint decoration in red at Matmar in the Badarian (Brunton 1948, 10).

2 They are reported to be polished red pottery with decoration by white paint (Brunton and Caton-Thompson 1928, 23).

3 Class B (black-topped pottery), Class P (polished red pottery), Class F (fancy forms), Class C (white cross-lined pottery), Class N (black incised pottery), Class W (wavy-handled pottery), Class D (decorated pottery), Class R (rough-faced pottery), and Class L (late pottery) (Petrie 1901, 1921).

4 The reader is referred to these publications for a detailed description of these classes.

tery is restricted to Upper Egypt, especially around the regions of Abydos and Naqada (Pl. 7). Morphologically, it is broadly divided into four groups: bowls/beakers[5] (open forms) or cups; carinated vessels; shallow round bottomed dishes; and jars (closed forms) (Newell 2013). The jar, in fact, is in the form known as caliciform beakers (Petrie 1921). The decorative elements are geometric in imitation of basketry or woven fabrics, or they consist of human and animal figures as well as plants (Petrie and Quibell 1896, 37-38; Arnold *et al.* 1993, 96). Some examples depict hunting scenes (Finkenstaedt 1981; Hendrickx *et al.* 2009, Table 1; Navajas 2011, 2012). Based on the analysis of the pottery at Armant, W. Kaiser (1957, 74) found that C-ware represented 5% among the three main wares (i.e., B-, P-, and C-wares[6]) in Stufe Ia.

The pottery vessels classified as black incised ware (N-ware) by W. M. F. Petrie (1921) represent impressions or incisions, which were often, though not always, filled in with white pigment (cf. Petrie 1901, 14; Smith 1991, 93).[7] The surface is often black to brown, with red variants occurring, too. The vessels of this ware include, in fact, ones in the form of caliciform beakers. For example, the ones registered as UC17869 and UC17870 are classified as black incised ware at the Petrie Museum catalogue (Pl. 3: 3-4), even though they are identified as caliciform beakers by some researchers (e.g., Midant-Reynes 2014, 6). Besides the two at the Petrie Museum, a few other N-ware objects in the form of caliciform beakers have been discovered at, for example, Mahgara 2 (Friedman 1994, 357; Hendrickx and Midant-Reynes 1988; Friedman and Hobbs 2002) and Armant (Mond and Myers 1937, 6; Ginter *et al.* 1986, 62; Friedman and Hobbs 2002), whereas they have not been found at any site in Lower Egypt. In general, the exclusive use of the technique of impression (rocker and simple impression) to decorate, with the addition of incised lines just to emphasize the borders (Gatto 2010, 145), appears to fill the zones with dots and dashes (Pl. 3-4). W. Kaiser (1957, 75) described N-ware as accounting for 3% of B-, P-, N-, D-, L-, and R-wares in Stufe IIb at Armant.[8]

The decorated ware (D-ware) in Petrie's classification is characterized by vessels made of marl clay and painted with dull red-brown ochre on the beige to

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5 Beakers here mean open bowls with wide mouths, bevelled sides, and flat bases that have a maximum diameter of ~15cm and a maximum height of ~10cm (Newell 2013).

6 B-ware (70-75%) and P-ware (20-25%).

7 The white pigment has been described variously as 'gypsum' by James Edward Quibell (1896, 13), 'white slip clay' by W. M. F. Petrie (1896, 37), and 'pinkish granular material' by Elizabeth Finkenstaedt (1981, 9).

8 R-ware (40-50%).

light brown exterior of the item (Friedman 1994, 98-99). Painted motifs varied from geometrical patterns such as wavy lines, zigzags, and spirals to figurative ones such as boats, plants, and animals (Petrie 1901, 15-16; Graff 2009, 25; Graff 2016). W. Kaiser (1957, 75) reported that D-ware made up 3% of B-, P-, N-, D-, L-, and R-wares in Stufe IIb at Armant.[9]

Caliciform beakers and painted pottery in Upper Egypt (C-, N-, and D-wares)

It can be considered that the aforementioned three kinds of Petrie's ware classes (C-, N-, and D-wares) have common characteristics with caliciform beakers in the late Neolithic period in the following ways:

Table 1. Common features with caliciform beakers

C-ware	✓ Similar beaker form. ✓ Geometrical pattern decoration including rim top decoration. ✓ Decoration made with white substances.
N-ware	✓ Similar beaker form. ✓ Geometrical pattern decoration including rim top decoration. ✓ Similar decoration technique (incisions or impressions filled with white substances).
D-ware	✓ Decoration made by color substances.

A caliciform beaker is the first kind of pottery that showed the decoration made by color pigment and the decoration in geometrical patterns, including the rim top decoration, among the pottery assemblage in Egypt (Pl. 2: 1-4[10]), even though the painting decoration made by reddish pigment and the decoration in geometrical patterns had been known in the southern Levant before that (e.g., Nordström 1972a, 1972b; Garfinkel 1999). Incised or impressed decoration accompanied with geometrical patterns and rim top decoration has a longer tradition in Nubia and Sudan than in Egypt, which makes logical to argue that it is Nubian (Bourriau 1981, 23; Friedman 1994, 194; Köhler 1996, 217; Glück 2007, 38-41). Caliciform beakers seem to have been developed in Upper Nu-

[9] According to Kaiser (1957, 75), B-ware represented 55-60%, P-ware and R-ware accounted for 20% each. It means that pottery showing decorations with colour pigments must have accounted for less than 5% in Stufe IIa.

[10] The vessel in Pl. 3: 1-2 is explained with the words, 'Tasian beaker' or 'caliciform beaker' by R. Friedman (1999).

bia (Longa 2011). Though caliciform beakers have been excavated at several sites in Sudan, Nubia, and Egypt, including the Western and Eastern Deserts of Egypt (Pl. 2: 1-4), only some examples found in Upper Egypt and Upper Nubia show the additional white filling in the incision and impression (Brunton and Caton-Thompson 1928, 23, MS24, MS25; Brunton 1934; Reinold 2001; Haaland 2012) (Pl. 2: 3 and 3: 1-4[11]). The beakers observed from Upper Egypt and the Western and Eastern Deserts of Egypt in the north to Central Sudan in the south are dated to the fifth millennium BCE, except for the Naqadian examples dated to the first half of the fourth millennium BCE (Sanada, forthcoming). No vessels in the form of caliciform beakers have been found in Lower Egypt. And the Tasian culture, whose pottery assemblage included caliciform beakers, is regarded as a nomadic culture (Hendrickx and Vermeersch 2000, 40; Friedman and Hobbs 2002, 189). Since caliciform beakers have been excavated from a well-dated settlement at Kharga Oasis (Briois *et al.* 2012), B. Midant-Reynes (2014) argues that "it allows us to sketch the cultural identity of the Tasian and to locate it at the roots of the Badarian. The Badarian now tends to be considered as a regional development of the Tasian nomadic culture, which occupied the southern part of the Egyptian Deserts and the Sudan during the fifth millennium." M.C. Gatto (2010, 154) finds a direct relationship between the caliciform beakers at Gebel Ramlah (in the Western Desert of Egypt) and those in Upper Nubia in terms of the shape, size, and kinds of decoration with impressed geometric patterns bordered by incisions. She (Gatto 2010, 156) furthermore says "they seem to highlight a family-level intragroup identity."

These observations might suggest that not only the characteristic form but also the decoration techniques (such as the use of white pigments and the geometrical pattern including the rim top decoration) of caliciform beakers originated in Upper Nubia had a strong influence on, at least, the two of Petrie's ware classes (C- and N-wares) (Pl. 2 for caliciform beakers, Pl. 3-4 for N-ware, and Pl. 5-6 for C-ware).

[11] Even though the example on Pl. 3: 3-4 are identified and reported as black incised ware (N-ware) on the Petrie Museum of Egyptian and Sudanese Archaeology (https://www.ucl.ac.uk/culture/petrie-museum, accessed on 20th May).

Methodology

In what follows, I compare the introduction process of painting techniques into the pottery production in Egypt with that in Mesopotamia, in which the two significant changes induced by "emulation" have been identified: first, the complexity in the design structure of decoration by the painting technique was enhanced, and second, the color contrast between motifs and backgrounds (i.e., dark-painted motifs over light-colored backgrounds) was maximized for catching audiences' eyes.

Emulation

Emulation, when applied to archaeological contexts, refers to a competitive social environment, in which groups and individuals seek to improve their relative status by adopting the material expressions (material culture, lifestyle, dining habits, and so on) of members of higher, more elevated groups or individuals (Miller 1982, 1985). Thus, emulation is not used as synonymous with 'imitation' here. Emulation is used to suggest 'rivalry' or 'competition' in this paper.

The process of emulation provides a dynamic force producing continual change in material items (Miller 1985, 186). O. Nieuwenhuyse (2009, 2017, 2018) holds that 'emulation' is one of the notions that explains the development process of the decorated pottery in Upper Mesopotamia during the Transitional Period and also explains the enhancement of the color contrast between the motif and the surface background.

Analysis

I am analyzing whether the two trends identified in the painted pottery at Tell Sabi Abyad can be observed in the pottery showing decorations with color pigments from Upper Egypt in the prehistoric periods. Alongside this aim, it should be noted that there were fundamental differences between the case of Upper Mesopotamia between *ca*. 6200-5900 cal BC and that of Upper Egypt in the Naqada period (*ca*. 3750-3100 cal BC):

- The available pottery data for Upper Egypt mostly comes from cemeteries, and that of Tell Sabi Abyad consists of vessels for domestic purposes.
- The percentage of painted pottery in Upper Egypt remained low (pottery showing decorations with color pigments may have accounted for less than

5% in Stufe IIa at Armant) and that of Tell Sabi Abyad was 80% or more during the Early Halaf, where the maximization of the motif-background contrast was one strategy to make the designs stand out from other painted pottery as painting techniques for pottery decoration had already been prevalent and common.

- A major technological innovation is represented by the development of a better control over firing conditions, which happened at Tell Sabi Abyad during the Transitional Period. Rather than using special pigments for black paint, it appears that in order to produce the new, black-on-buff painted Standard Fine Ware, the potters at Tell Sabi Abyad experimented with varying oxygen conditions in the oven (Van As *et al.* 1998). In Upper Egypt, although B-, P-, and R-classes were known since the Neolithic period (i.e., the Badarian), the technique to produce black-topped vessels was originally discovered by accident, most likely owing to attempts to produce pottery with less porosity (Petrie 1901, 13-14; Hendrickx and Friedman et al. 2000). The polished red pottery, in which red wash was applied, were also made with the aim of reducing permeability (Rice 1987, 151), even though they may have ultimately been made for their decorative qualities (Brunton and Caton-Thompson 1928, 22). This indicates there was an apparent difference in the firing technology (e.g., controlling fire temperature) between the two: Tell Sabi Abyad during the Transitional Period (between *ca*. 6200-5900 cal BC) and Upper Egypt during the Naqada period (between *ca*. 3750-3100 cal BC).

In addition to these, I focus only on pottery showing decorations with color pigments (not on pottery vessels with decorations by other kinds of decoration technique) in order to try to find out if the two trends which were identified in the development of the painted pottery at Tell Sabi Abyad can be observed in the pottery assemblages in Upper Egypt and how the case of Egypt is different from that of Upper Mesopotamia.

Trend 1: Gradually increasing complexity in the design structures of decoration by painting techniques

In the case of decoration made with color pigments (C-, N-, and D-wares) in Upper Egypt in the prehistoric periods, the design structures of painted decoration were already somewhat complex in the first place. Seeing the transition of popular decoration patterns in D-ware (Payne 1992, Figs. 3-5), we notice that the painted decoration varied and was complex from the beginning, especially in

D-ware (Payne 1990). Some items show similar geometrical pattern decoration (e.g., D59b), including rim top decoration (e.g., D63a) to the caliciform beakers. D-ware, however, lasted for the longest period (Naqada IIA-IID2) among the above-mentioned three kinds of Petrie's ware classes (Payne 1990, 1992).

Since the examples identified as N-ware, which were known during Naqada IIA-IID1 (Payne 1992) are limited, it is difficult to observe if there was a transitional change, in which the design structure gained complexity gradually. However, the similar geometrical pattern decoration (e.g., triangles filled with impressed dots such as in Petrie 1921, Pl. XXVI) including rim top decoration, the decoration on the wall inside, and the similar inlay decoration technique (i.e., incised lines filled in with white pigment) (Pl. 3-4) to caliciform beakers may indicate that N-ware introduced Nubian traits, as Anthony John Arkell (1953) mentioned, even though the fabric and the manufacturing technique belonged to the Egyptian tradition (Bourriau 1981, 23). In fact, the examples identified as N-ware by W. M. F. Petrie include caliciform beakers (UC17869 and UC17870) (Pl. 3: 3-4), which have a characteristic flared mouth beaker form and a distinctive incised geometrical decoration pattern.

C-ware (white cross-lined ware) appeared from Naqada I period to Naqada IIA (Payne 1992; Hendrickx 1996). Although figurative designs such as plants, animals, and humans are often discussed by many researchers (e.g., Finkenstaedt 1981; Hendrickx *et al.* 2009, Table 1; Navajas 2011, 2012) (Pl. 5: 1, 5: 4 and 6: 1-2), they account for less than a quarter of the pots within the data set of C-ware (Newell 2013). Most C-ware showing geometric designs (Pl. 5: 2-3 and 6: 3-5) are considered to mimic the woven patterns of basketry, as say some researchers (e.g., Hendrickx and Eyckerman 2018, 35). Some of the items show similar geometrical pattern decoration (e.g., triangles filled with dots or lines (e.g., Petrie 1921, Pl. XXIV)), including rim top decoration, the decoration on the wall inside, and the decoration made by white pigment (Pl. 5: 3 and 6: 3-4) to caliciform beakers, which may indicate that C-ware introduced Nubian traits. Notwithstanding, it lasted only for eighty to one hundred years after its introduction (Newell 2013). The variety and complexity of the designs are obvious from the beginning (Navajas 2011, 2012).

Caliciform beakers are the artefacts that showed the decoration made by white colorant pigment and used the geometrical pattern designs in the pottery assemblage of Egypt for the first time. Then, considering that even though the painting technique became popular in the successive phases in Upper Egypt and Lower Egypt, most painting was executed with red paint except for white cross-lined ware (C-ware) and black incised ware (N-ware) seen in Upper Egypt

and a few sherds of atypical vessels, which are thought to have been produced by immigrants from the southern Levant at Buto Ia in Lower Egypt (Faltings 1998a, 30-31; 1998b, 367; 1998c, 37). These make us notice that white cross-lined ware (C-ware) and black-incised ware (N-ware), some of which are even in caliciform baker-like form, were the kinds of vessels that were produced locally[12] with introduced Nubian traits. In the process of introducing Nubian traits into Upper Egyptian local pottery, caliciform beakers might have played an important role. Presumably, potters in Upper Egypt not only introduced the decoration technique (the inlay decoration technique with white pigment), the characteristic beaker form, and geometrical pattern designs (Pl. 3-6) but also might have arranged a new technique and a geometrical pattern locally. As a result of the arrangement, some C-ware vessels show human figures, animal figures, and plants as well as the practical painting decoration technique (Pl. 5-6), which cannot be seen on caliciform beakers that originated in Nubia and which is different from the inlay decoration technique introduced from the Nubian pottery tradition. On the whole, clear gradually increasing complexities in the design structures of decoration by painting techniques are not found in the case of Upper Egypt between the Late Neolithic and Naqada IID1 periods.

Trend 2: Enhancement of the color contrast between motifs and the background

Table 2. Correlation between three ware classes (C-ware, N-ware, and D-ware) and related information

	Period	Color contrast between motifs and background	Reference
C-ware	Naqada I – Naqada IIA	White on red or reddish brown	Payne 1992
N-ware	Naqada IIA – Naqada IID1	White on black or brown	Payne 1992
D-ware	Naqada IIA – Naqada IID2	Red on brown or pink or buff	Payne 1992

[12] C-ware vessels were made from Nile clay (Hendrickx 2006, Tab. II). N-ware vessels were made from sand tempered Nile clay, classified as M2.01 by Nordström. Although this ware is typical of Terminal Abkan contexts in Lower Nubia, Nordström notes that it appears to be related to the burnished wares of the Khartoum Neolithic (1972a, 28, 59).

Table 3. Tell Sabi Abyad. Darkness-lightness (Munsell) values of surfaces and painted motifs of ceramic wares 6300-5900 cal BC (from Nieuwenhuyse 2017, Fig. 10.5)

	Darker ← Munsell value → Lighter 2 3 4 5 6 7 8
Bitumen-Painted Standard Ware	motif — surface
Incised-plastered Grey-Black Ware	surface — motif
Painted Standard Fine Ware; Halaf	motif — surface

Table 4. Upper Egypt. Darkness-lightness (Munsell) values of surfaces and painted motifs of ceramic wares in the 5th and in the first half of the 4th millennium BCE

	Darker ← Munsell value → Lighter 2 3 4 5 6 7 8
Bitumen-Painted Standard Ware	motif — surface
Incised-plastered Grey-Black Ware	surface — motif
Painted Standard Fine Ware; Halaf	motif — surface

O. Nieuwenhuyse (2017, 125) believes that over successive generations, ceramic innovation progressively moved towards maximizing design-surface contrast in Upper Mesopotamia in *ca*. 6200-5900 cal BC. One crucial factor would have been the effects of superior contrast in facilitating the visual transmission of stylistic information. This contrast-rich ceramic category won and superseded all other painted pottery groups by the Halaf period. The know-how and special skill for making dark-painted Fine Ware (the Standard Fine Ware) in the Transitional and Early Halaf periods may have been especially valued, leading to processes of emulation (Nieuwenhuyse 2007; 2017, 125). According to his point of view, O. Nieuwenhuyse (2017, 124) describes the Standard Fine Ware as it finally appeared as the one that shows a comparatively strong contrast effectively between the dark painted motifs and the light-colored surface background (Pl. 1). It is found that the lightness to darkness contrast was not always as pronounced as that of the bitumen-painted Standard Ware or the incised-and-plastered Grey-Black Ware (see Table 3), but this category offered the advantages of production in large, increasing numbers and a strong binding of the pigments (Nieuwenhuyse 2017, 125).

Regarding pottery showing decoration made by color pigments in Upper Egypt, as we can see in Tables 1 and 2,

- C-ware, among the Petrie's three ware classes (C-, N-, and D-wares), which show the decorations made with color pigments, initially appeared in Upper Egypt. Since there was no 'white on red' decoration in pottery known in the surrounding regions during the contemporaneous and prior periods, even though it is not beyond much conjecture, C-ware might be a kind of ware that developed from the red slip, which had already been known at the Nabta Kiseiba area (the Ru'at El Baqar phase dated to *ca.* 5500-4800 BC) (e.g., Nelson 2002a, 7; Nelson 2002b, 46), in Upper Egypt (the Badarian dated to c. 4400-4000 BCE) (Brunton and Caton-Thompson 1928; Hassan 1985: 107), and in the Fayum region (the Neolithic Fayum dated to *ca.* 5480-4260 cal. BC) (Caton-Thompson and Gardner 1934, 35-36; Shirai 2010, 49), with the addition of the paint given by white pigments. The idea to use white pigment for pottery decoration might have been derived from Nubian pottery traits (i.e., caliciform beakers) known even in the Tasian pottery assemblage because no pottery decorated with white pigment was present contemporaneously or previously in Egypt, Lower Nubia, or the southern Levant except for caliciform beakers. If so, that might also be the reason why some C-ware shows a caliciform-beaker-like form. One of the possible reasons why this ware did not last as long as D-ware is that it may be due to the extra labor needed (Nieuwenhuyse 2017, 124) and the susceptibility to erosion of the post-firing treatments (Pl. 6: 5).
- B. Glück (2007) argues that decorations made by an impression or an incision on N-ware point to a strong alignment with the Neolithic pottery tradition known from the Saharo-Sudanese area. The ones registered as N-ware purchased at Luxor (UC17869 and UC17870) also show incised decorations filled with white pigment (Pl. 3: 3-4). The use of white pigments for the decoration on N-ware indicates a close affinity with the pottery tradition in Nubia (i.e., caliciform beakers) (e.g., Kaiser 1957; Glück 2007). Among the pottery assemblages of Central Sudan, Nubia, Egypt, and the southern Levant, the use of white pigment for pottery decoration first appeared on caliciform beakers observed in Lower Nubia, Sudan, and Egypt, and then secondary appeared on C-ware and N-ware exclusively in Upper Egypt. Glück (2007, 29) further mentions that black colored ware was rare among the prehistoric pottery assemblages in Upper Egypt and non-existent in Nubia. N-ware appeared in Naqada IIA. If so, the color contrast between motifs and their backgrounds among the Upper Egyptian pottery assemblage was

maximized more than ever in the white on black ware (N-ware); it, however, disappeared by Naqada IID1. One of the reasons why this ware did not become predominant in Upper Egypt would be because it required special effort to be made like the incised-and-plastered Grey-Black Ware in Upper Mesopotamia (Nieuwenhuyse 2017, 124-125).

- D-ware is described as red on brown or pink or buff (Payne 1992) and remained by Naqada IID2 even after the other two classes (i.e., C-ware and N-ware) were mostly abandoned. It, however, seems that there is more contrast between white on red (C-ware) and white on black (N-ware) than red on buff (D-ware). Thus, my study appears to suggest that enhancement of the color contrast between motifs and the background was not a high priority in the pottery production of Upper Egypt. Nevertheless, considering the darkness-lightness (Munsell) values of surfaces and painted motifs of C-ware, N-ware, and D-ware (see Table 4) and seeing those of Bitumen-Painted Standard Ware, Incised-plastered Grey-Black Ware, and Painted Standard Fine Ware at Tell Sabi Abyad in *ca*. 6300-5900 cal BC (see Table 3), it should be noted that a similar switchover happened in both regions in terms of enhancement of the color contrast: both the painting technique of Painted Standard Fine Ware at Tell Sabi Abyad and that of D-ware in Upper Egypt might have been chosen because of the enhancement of the color contrast without the labor that was needed for C-ware and N-ware. It is possible that the red on buff (D-ware) offered the advantages of production in large, increasing quantities and a strong binding of the pigments on the pottery surface, even though the percentage of D-ware among the total pottery assemblage in Upper Egypt was kept low compared with painted pottery (i.e., Painted Standard Fine Ware) in Upper Mesopotamia during *ca*. 6200-5900 cal BC.

Considering the color contrast, the color used for the painting decoration on pottery surfaces in Upper Egypt probably changed in search for more efficient (i.e., less labour-intensive) painting decoration techniques. C-ware and N-ware might have been replaced by D-ware for the efficiency, even though it might have been just one of the reasons for the shift in decoration techniques.

Short concluding remarks

The comparative analysis makes it clear that explicit gradually increasing complexities in design structures of decoration by painting techniques are not found

in the case of Upper Egypt between the Late Neolithic and Naqada IID1 periods. The design structures of painted decoration were, in fact, complex from the beginning.

In the case of Upper Mesopotamia during the Transitional Period between the Pre-Halaf and the Early Halaf (i.e., between *ca*. 6200-5900 cal BC), the enhancement of the color contrast between motifs and their backgrounds on pottery surface occurred in increasing scope to facilitate their role in commensal events (Nieuwenhuyse 2017, 125). In the case of Upper Egypt, when potters introduced genuine painting techniques for pottery decoration during the Naqada period, this study reveals that one of the reasons why the color pigment used for the painting decoration on pottery surfaces in Upper Egypt changed from white (i.e., C-ware) to reddish (i.e., D-ware) was probably mainly to seek more efficient (i.e., less labour-intensive) decoration techniques. In other words, C-ware and N-ware might have been somehow replaced by D-ware for the efficiency.

Based on the analysis of the painted pottery at Tell Sabi Abyad in *ca*. 6200-5900 BC, O. Nieuwenhuyse (2009, 2017) observed that a gradual local change ('painted-pottery revolution') was stimulated by 'emulation.' In Upper Egypt, however, 'emulation' of individuals within a competitive social environment might have been gratified by more focusing on the introduction of foreign kinds of decoration and then arranging these locally and changing them towards becoming a local pottery decoration. Since the period when painting techniques were introduced into pottery production was the time when social complexities in Upper Egypt were growing towards the unification of Egypt (e.g., Köhler 2017), it is conceivable that one of the notions that explain the introduction of the various motifs and techniques (e.g., impression, incision, painting, and application) (e.g., Wodzińska 2009, 12) for pottery decoration in Upper Egypt might be 'emulation.'

Through a detailed review of the introduction process of painting technique in Upper Egypt, this study shows that white cross-lined ware (C-ware) and probably also black incised ware (N-ware) were the kinds of ware vessels produced locally by incorporating Nubian pottery traits. In the process, caliciform beakers might have had an important impact on Upper Egyptian pottery in terms of the beaker form, the geometrical decoration pattern including rim top decorations, the decoration on the wall inside, and the decoration achieved with white substances. Based on an analysis of N-ware, Glück (2017, 41) suggests that the presence of Nubian ethnic groups from the Saharo-Sudanese area as inhabitants of the Egyptian Nile Valley. Gatto (2011, 94-95) mentions that "the southern part

of the Egyptian Nile Valley shows a strong Nubian connection during the fourth millennium BCE based on her study at Nag el-Qarmila in Upper Egypt (dated to Naqda IC- IID-IIIA1). Its proximity to Lower Nubia and the contemporary A-Group culture keeps their Nubian cultural background alive within the local population. This is particularly visible in the pottery and lithic assemblages" and gives examples such as locally made black mouthed vessels (that originated in Nubia) which show an Egyptian style form and surface treatment. My current observation about C- and N-ware and Nubian traits' influence on them supports Glück's and Gatto's remarks.

If it is thought that a painting decoration technique was totally alien to the prehistoric ceramic traditions of Africa in the Neolithic period, how were painting decoration techniques introduced into the pottery assemblages of Egypt and Nubia? This study may indicate one of the clues to answering the question. Although the painting decoration first appeared in Upper and Lower Egypt at almost the same time towards the end of the fifth millennium BCE and in the first half of the fourth millennium BCE (Brunton and Caton-Thompson 1928, 22-23; Rizkana and Seeher 1987, 23-33; Friedman 1994), if we focus on the painting decoration made with white pigment, which was the first decoration made not by inlay decoration techniques but by genuine painting techniques in Upper Egypt prior to the one made with red pigment, it is clear that it was uniquely seen only in Upper Egypt among the pottery assemblages in Egypt and Nubia in the prehistoric period, and in fact, it was not seen even in the southern Levantine pottery assemblage in the prehistoric period. These circumstantial evidence may suggest that the painting decoration made with white pigment seen on white cross-lined ware in Upper Egypt was the first kind of decoration made by the genuine painting technique in Upper Egypt and a kind of technique that might have been invented locally in Upper Egypt in the process of introducing both the inlay decoration technique using white pigment from the Nubian pottery traits and the painting decoration technique from the southern Levant, even though the painting was not made with white but mostly reddish pigment in the southern Levant. White cross-lined ware might have been produced as a result of the hybridization of the two ceramic techniques introduced in Upper Egypt.

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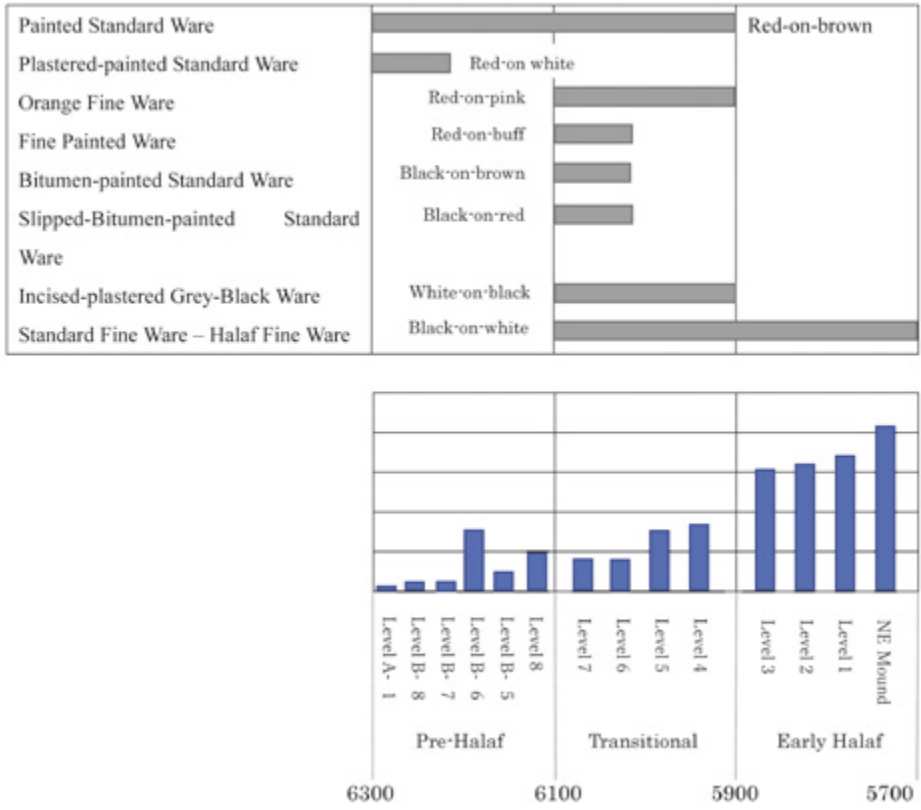
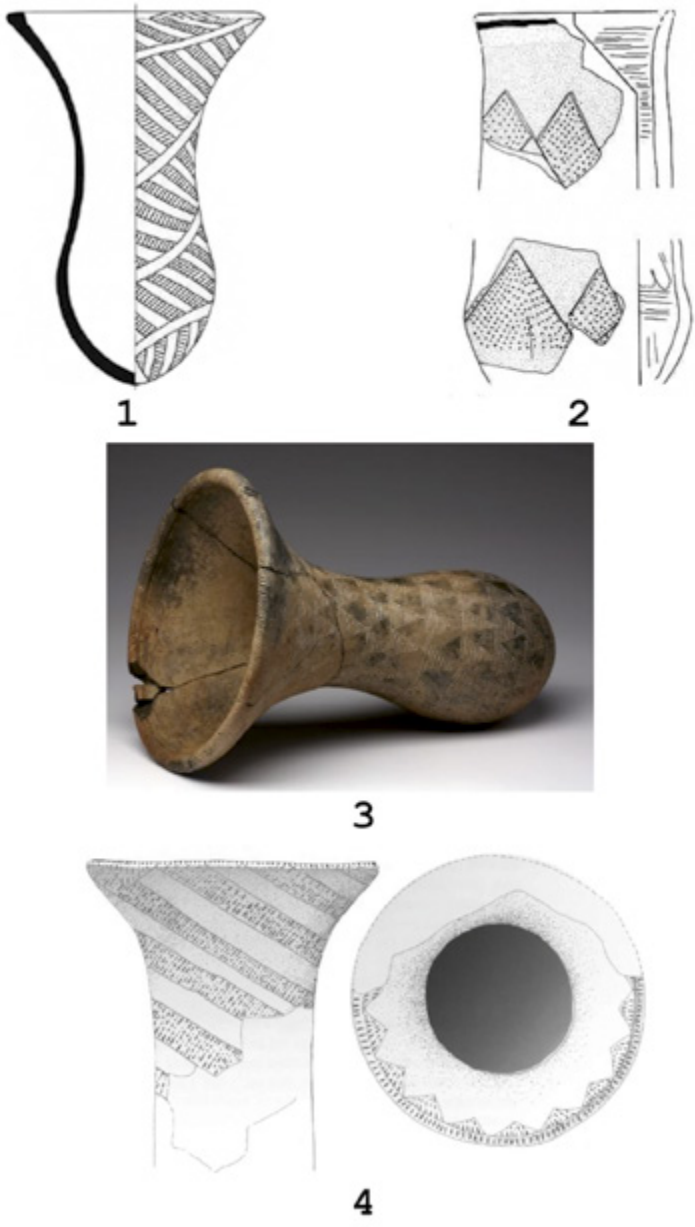


Pl. 1 – Tell Sabi Abyad. Chronological spread of alternative approaches to achieving surface-design contrast during the Pre-Halaf, Transitional, and Early Halaf stages (upper) plotted against the rising proportion of painted ceramics (after Nieuwenhuyse 2017, Fig. 10.7)



Pl. 2 – Caliciform beakers, showing their characteristic decoration and form

Pl. 2: 1 – Caliciform beaker found at R12 cemetery (Salvatori 2002, Fig. 3.2)

Pl. 2: 2 – Caliciform beaker found at Wadi Atulla (Friedman and Hobbs 2002, Fig. 4b)

Pl. 2: 3 – Caliciform beaker found at Kadero. © Archaeological Museum in Poznań (courtesy of Archaeological Museum in Poznań)

Pl. 2: 4 – Caliciform beaker found at Gebel Ramlah (Gatto 2010, Fig. 3.4.1)

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Pl. 3 – Vessels of black incised ware (N-ware), showing the geometric pattern decoration, inlayed incisions, and rim top decoration in various forms (including the ones in caliciform beaker like form)

Pl. 3: 1-2 – Beaker found at el-Badari. British Museum No. EA59723. © The Trustees of the British Museum (courtesy of the British Museum, Department of Egypt and Sudan). The 3D image by this author

Pl. 3: 3 – Black incised ware. University College London No UC17869. © UCL

Pl. 3: 4 – Black incised ware. University College London No UC17870. © UCL

Pl. 4 – Vessels of black incised ware (N-ware), showing the geometric pattern decoration, inlayed incisions, and rim top decoration in various forms

Pl. 4: 1 – Black incised ware, showing rim top decorated with curved zig-zag impression found at Naqada. University College London No UC5722. © UCL

Pl. 4: 2-3 – A bowl of black incised ware, showing rim top decorated with curved zig-zag impression. Petrie Museum of Egyptian and Sudanese Archaeology No UC17873 (courtesy of Petrie Museum of Egyptian and Sudanese Archaeology). The 3D image by this author

Pl. 4: 4 – A bowl of black incised ware, showing rim top decoration found at Naqada Cemetery. Petrie Museum of Egyptian and Sudanese Archaeology No UC5726 (courtesy of Petrie Museum of Egyptian and Sudanese Archaeology). The 3D image by this author

Pl. 4: 5 – A bowl of black incised ware, showing rim top decoration found at Naqada Cemetery. Petrie Museum of Egyptian and Sudanese Archaeology No UC5723 (courtesy of Petrie Museum of Egyptian and Sudanese Archaeology). The 3D image by this author

Pl. 5 – Vessels of white cross-lined ware (C-ware), showing the geometric pattern decoration and rim top decoration in various forms (including the ones in caliciform-beaker-like form and the ones with figurative pattern decoration)

Pl. 5: 1 – A beaker of white-cross ware, showing decoration on the wall inside. Type C98N. Petrie Museum of Egyptian and Sudanese Archaeology No UC15332 (courtesy of Petrie Museum of Egyptian and Sudanese Archaeology). The 3D image by this author

Pl. 5: 2 – A bowl of white-cross ware, showing decoration on the wall inside. Type C27E: Petrie Museum of Egyptian and Sudanese Archaeology No UC15305 (courtesy of Petrie Museum of Egyptian and Sudanese Archaeology). The 3D image by this author

Pl. 5: 3 – A beaker of white-cross ware, showing decoration on the wall inside. Type C76L. Petrie Museum of Egyptian and Sudanese Archaeology No UC15313 (courtesy of Petrie Museum of Egyptian and Sudanese Archaeology). The 3D image by this author

Pl. 5: 4 – A beaker of white-cross ware, showing decoration on the wall inside. Type C96L. Petrie Museum of Egyptian and Sudanese Archaeology No UC15334 (courtesy of PetrieMuseum of Egyptian and Sudanese Archaeology). The 3D image by this author

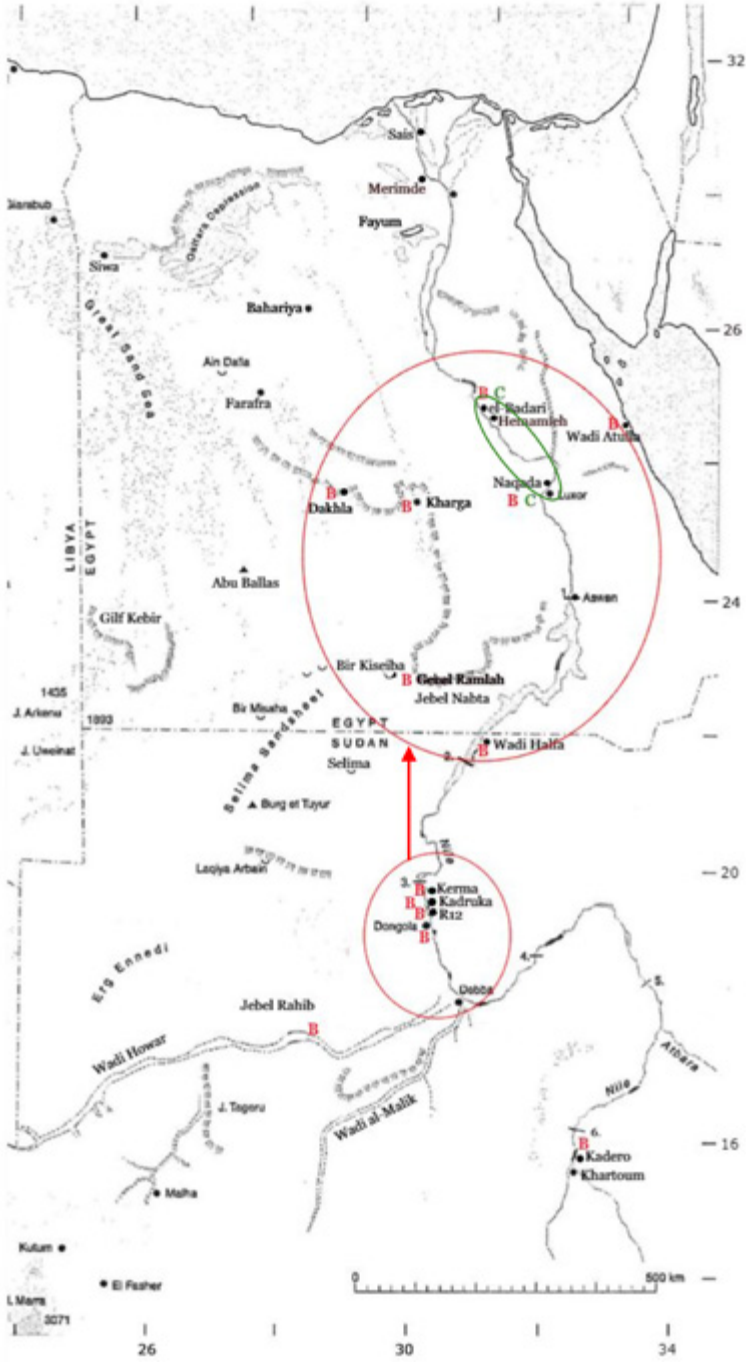
Pl. 6: 1 – White cross-lined ware, showing decoration (geometrical and faunal pattern) on the wall inside. University College London No UC15337. © UCL

Pl. 6: 2 – White cross-lined ware, showing geometrical and faunal pattern decoration on the wall inside and outside. University College London No UC15339. © UCL

Pl. 6: 3 – White cross-lined ware, showing geometrical pattern decoration on the wall. Musée du Louvre No E28029. © Musée du Louvre / Christian Décamps

Pl. 6: 4 – White cross-lined ware, showing geometrical pattern decoration on the wall inside and outside. University College London No UC15313. © UCL

Pl. 6: 5 – White cross-lined ware: cracked out white paint (courtesy of Petrie Museum of Egyptian and Sudanese Archaeology). Photo by the author



Pl. 7 – Locations of the sites where caliciform beakers and white cross-lined ware were found (B stands for caliciform beakers, C stands for white cross-lined ware)