KEYWORDS: ***Rock art – Technology of communication – Semasiography – State formation***

THE ROLE OF ROCK ART IN EARLY STATE FORMATION

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Abstract. It has long been suggested that the development of writing played a key role in the formation of primary states. This exploratory paper asks whether other technologies of communication, such as rock art, played an important role in early state formation. A comparison of the chronological, geographic and macrosocial contexts of rock art use among early states in different parts of the world — Egypt, Mesopotamia, the Indus River valley, China, Mesoamerica and the central Andes — demonstrates that rock art not only served as an index for various processes of state formation such as trade and warfare, but that it also complemented the role of writing as a system of cultural expression.

Introduction

Since their inception more than one hundred years ago, theories of state formation have frequently argued that the development of glottographic writing — i.e. graphic systems which represent language — was a fundamental step towards the emergence of early states (e.g. Childe 1950; Flannery 1972; Morgan 1985 [1877]; Service 1975). In this sense, writing has often been equated with the very beginnings of 'civilisation'; concomitant with the emergence of state societies characterised by ruling elites, an elaborate and coercive socio-political apparatus or bureaucracy, agriculture and urbanism (Bogucki 2000: 335; Claessen 1996: 125; Smith 2003: 90–91). Thus, with the possible exception of Andean states, Teotihuacán in central Mexico, and some of the later state societies of sub-Saharan Africa (Colas 2011; Flannery 1998; Taube 2000; Urton 1998), the archaeology of early states has, almost by definition, also been the archaeology of writing systems.

Certainly, the invention of writing had profound macrosocial effects on state-level societies — e.g. the elaboration of record keeping, the creation of propaganda, the emergence of administrative specialisation, and the transformation of ephemeral ideas transmitted orally into permanent forms (Houston 2004: 227; Postgate et al. 1995: 463–464). A key question which remains unanswered, however, concerns whether writing is the only communication technology to have had such dramatic effects on early state societies. Anthropologists are well aware, for instance, that not all early states used graphic writing systems as a medium of communication. In Peru, the khipu system of coloured and knotted ropes was deployed to convey elaborate messages and historical narratives (Urton 1998). In addition, some state societies with syllabic and logographic writing systems such as the Maya and Zapotecs of ancient Mesoamerica also made use of semasiography, i.e. non-language-based signs (Marcus 1976: 38). The coexistence of writing systems and semasiography in some early states, in turn, suggests that a broader view of ancient communication technologies may be advantageous to the study of state formation processes.

The question this paper seeks to answer, then, is to what extent semasiographic systems of communication have had an impact on the process of early state formation (Claessen 1984: 365; Smith 2003: 84). More specifically, it focuses on the role that rock art — i.e. anthropic markings on rock surfaces, produced either through the addition of pigments or other substances (pictograms) or a process of abrasion or percussion (petroglyphs) — played in the emergence of primary states from chiefdoms and other complex societies. This is a particularly important area of investigation because rock art has most commonly been associated with hunting-gathering societies rather than state-level societies (e.g. Ross 2001: 453; Ouzman 2002: 31). As a result of this misconception, a great deal of information regarding the communication technologies of early states appears to have gone unnoticed in theoretical treatments of the process of state formation. This paper aims to partially remedy the situation by comparing the role rock art has played in the formation of primary states around the world. Although the use of rock art among secondary state societies has been documented in many regions such as Tibet and Southeast Asia, among others (Bellezza 2000; Nash 2003), this paper will focus on the classic loci for early state development — i.e. Egypt, Mesopotamia, the Indus River valley, the Yellow River in China, Mesoamerica and the central Andean region of South America (Childe 1950; Fried 1960; Service 1975; Spencer and Redmond 2004) (Fig. 1). I start by briefly reviewing the theoretical and

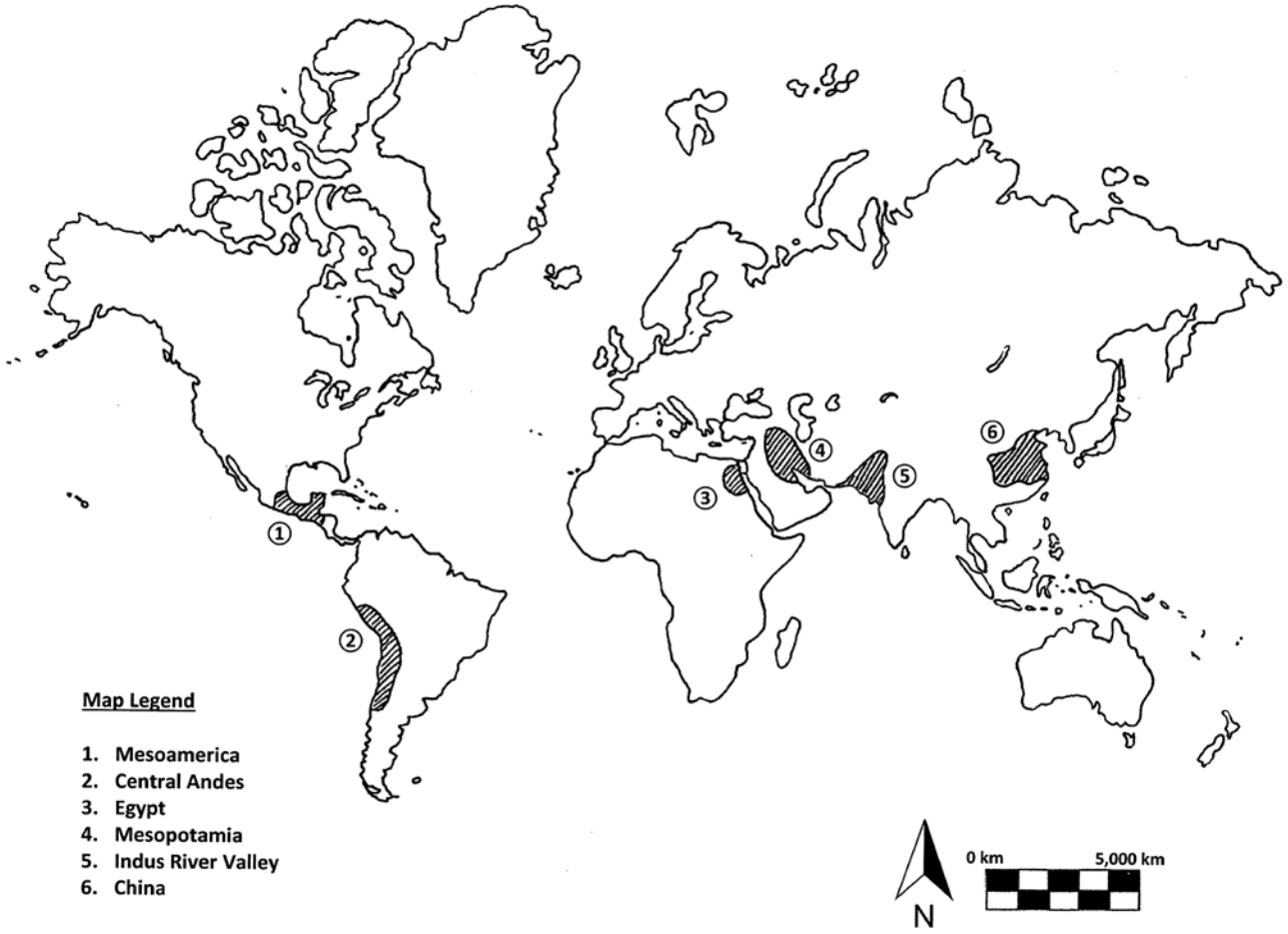

Figure 1. *Map of the world, indicating the distribution of early state societies and their associated rock art. Drawing by the author.*

methodological implications of investigating rock art as a semasiographic system of communication which, unlike glottographic writing, can encode meanings directly without the imposition of language (Houston 2004: 228).

Rock art as semasiography

For most of the 20th century the general consensus among both archaeologists and epigraphers has been that rock art, along with notched bone tallies, potter's marks and other graphic markings characteristic of semasiography, served as the evolutionary precursor to early writing systems (Gelb 1969; Justeson 1986; Schmandt-Besserat 1992). According to this perspective, such non-linguistic forms of communication not only consisted of mnemonic devices and descriptive modes of representation but were also transparently iconic and semantically limited (Gelb 1969: 27, 34, 252; Sampson 1985: 30; Ullman 1969: 5–7). It is now clear, however, that semasiographic systems of communication are much more complex and developed parallel to writing in many societies (Sampson 1985: 30), including state-level societies. Many deployed mixed systems that used some combination of linguistic symbols and various forms of semasiography, which were often pictographic in Gelb's sense of the term (1969: 37; see also *IFRAO Glossary*). The existence of such mixed writing systems is already well described in Mesoamerica by Marcus (1976, 1992) and others (e.g. Justeson 1986; Prem 1969, 1979; Urcid 2001). Within Mesopotamia, by contrast, pictographs were less common in early cuneiform tablets and seals (Schmandt-Besserat 1992: 5). In Egypt it has been noted that the heavily pictographic archaic hieroglyphic script of the Old Kingdom (c. 3150 BCE) was heavily influenced by pre-dynastic and early dynastic potter's marks, stone grave markers, jar seals, ivory plaques and rock art (Hoffman 1979: 291; Ray 1986: 309–310). In China, both potter's marks from the Neolithic period (c. 6000–1700 BCE), and Shang bronze vessels and oracle bone inscriptions from the early Bronze Age (c. 1200–1045 BCE) indicate that the earliest logographic forms of Chinese writing also used iconic representations of objects to represent words (Boltz 1986: 424; Moore 2000: 18–19). Clearly, in the case of these early states, semasiography and glottographic writing were contemporaneous forms of communication.

Of course, not all early states developed glottographic writing systems or relied on semasiographic systems based on pictography. In the central Andes, for instance, several state-level societies deployed non-iconic modes of communication based on the use of weaving as a culturally-significant means of expression (Houston 2004: 236). Known as khipu among the Inca, these

knotted and coloured strings were among the last in a long series of recording technologies which first appeared among the Huari (Burger 1989: 47). In contrast to Gelb's assumption that semasiographic systems are semantically simple and functionally limited (1969: 27), the Andean khipu technologies appear to have been capable of not only recording quantitative data such as censuses, inventories and tribute deliveries but were also able to communicate songs, genealogies and historical narratives (Urton 1998: 409–410). This latter interpretation, however, points to an interesting problem in the study of Andean khipus — i.e. whether they represent a non-graphic form of writing or a unique form of semasiographic expression. Certainly, Urton argues that the Inca khipu were similar to other forms of writing and could encode nouns, coefficients and verbs in grammatically-arranged narratives (1998: 413–426). However, his views are largely based on Spanish transcriptions of Quechua translations of the khipu. They thus represent third order interpretations of the data and may betray Spanish biases in favour of phoneticism. Although a final verdict on this issue must await further study of surviving Inca khipu, the Andean khipu tradition opens up the possibility that early states did not have to depend on glottographic writing but could function adequately using semasiography.

The presence of semasiographic systems of communication in early states appears to be well-documented in the archaeological literature. As a result, semasiography can no longer be considered in evolutionary terms as preceding glottographic writing but should be examined on its own terms. Moreover, in some cases, these semasiographic systems need not consist of pictography but may include highly abstract and conventional signs (Houston 2004: 236). It also appears that semasiographic signs are closely associated with other forms of cultural expression — e.g. ceramics, bronze vessels, oracle bones and textiles. This, in turn, suggests that semasiographic systems of communication cannot be separated from other aspects of a society's material culture but must be understood within broader systems of material symbolisation and cultural expression (Bray 2002). To accomplish this task, this study seeks to situate rock art assemblages within specific chronological, geographic and macrosocial frameworks associated with early states.

Establishing a chronological relationship between specific rock art compositions and early states hinges on the identification of reliable dates for the rock art. That is, since many early states developed within a relatively specific timespan, from c. 3500 BCE in Mesopotamia to 500 CE in the Andes (Service 1975: 5; Stanish 2001: 54), it is crucial to recover dates from archaeological sites containing rock art that may be associated with an early state. Rock art, of course, is notorious for being difficult to date using direct dating techniques (Bednarik 1994: 161–163, 2002). Thus, many of the chronological correlations between rock art compositions and early states made in this paper will rely upon relative or indirect dating techniques. One such method involves directly comparing rock art motifs with the iconography of other forms of cultural expression, such as ceramics or mural painting. The problem with this approach is that rock art motifs may be much older or younger than other material symbols used in early states (Davis 1978: 216). An alternative form of relatively dating works of rock art uses the method of triangulation to date rock art by comparing its iconic representations of domesticated animals with the known dates of domestication for that animal within the same geographic zone (e.g. Lewis 1995: 180; Hyslop 1977: 53; Linares Málaga 1978: 371). When possible, this operation can provide useful maximum dates for rock art images — e.g. the date of first domestication. And if datable stylistic associations are included, then a minimum date for rock art images can also be inferred — i.e. the dates associated with material symbols containing similar forms of iconography (Bednarik and Li 1991: 25–28). Unfortunately this approach depends on the etic or figurative identification of the motifs, which is untestable and has been shown to fail (e.g. Macintosh 1977). The geographic distribution and inter-site spatial associations of rock art compositions can often serve as valuable guides to situating rock art in early state contexts. Indeed, the presence of rock art assemblages in the classical loci for early state development — i.e. Egypt, Mesopotamia, the Indus River valley, the Yellow River region in China, Mesoamerica and the Andean region of South America (Spencer and Redmond 2004) — can be taken as good circumstantial evidence, assuming a chronological relationship is also present, for rock art having played a significant role in the processes of state formation all over the world. Of course, this may seem like an obvious point. And yet, it bears repeating in the strongest possible terms given the prevailing view that rock art was primarily the product of ancient hunters and gatherers.

With regard to the macrosocial realm, the socio-economic affiliations of rock art compositions can best be obtained by the comparison of its motifs with actual artefacts as well as the iconography of material symbols used in early state societies, such as ceramics, sculpture, monumental and household architecture, textiles, funerary paraphernalia, and of course various scripts (DeMarrais et al. 1996: 16–19). Likewise, the geographic distribution of these images, when tied to a temporally-bound polity, can also be used to track relationships between early states and the nature of these relationships relative to trade or warfare. Unfortunately, the temporal and geographic contexts of rock art compositions are often insufficient for identifying the specific ideologies attached to various motifs and symbols in rock art (Hodder 1993: 124–129). Direct historical approaches can be helpful if some degree of cultural continuity exists between ethnohistorical sources and the rock art under investigation. The approach adopted in this study is to compare the iconography of the rock art with other

symbols present in the state society under investigation, supplemented by direct historical comparisons when necessary. It is fortunate that numerous site-specific studies and field reports on the rock art of early states are available, making such a comparative analysis possible. However, as with any synthesis of this scope, it was simply not feasible to review the entirety of this vast literature. In order to maintain the multiregional breadth of this survey without sacrificing the depth of its contextual analyses, this paper focuses on the most frequently cited field reports as well as on more recent regional syntheses. With these caveats in mind, let us examine the evidence for the impact of rock art on early state formation region to region.

Egypt

Of all the regions in which early states developed, the rock art of Egypt is unique in the sense that it represents a complex amalgam of stylistic evolution and diffusion from the probable late Paleolithic (c. 13 000 BCE) animal representation at Qurta and the Epipaleolithic (c. 7000 BCE) fish-trap designs of El-Hôsh (Huyge 1998, 2005, 2009; Huyge and Ikram 2009; Muzzolini 1999) to the so-called pastoralist rock art traditions characteristic of much of the Sahara during the Neolithic after 5500 BCE (Davis 1984: 87; Smith 1968: 10–11, 16–20). Egyptian rock art containing hieroglyphic carvings and Greco-Roman inscriptions also indicates that these pecked and incised designs span a broad chronological range from the First Dynasty of the Old Kingdom to the Byzantine period (Regulski 2008). Despite this complicated chronological, stylistic and cultural picture (Le Quellec and Huyge 2008), over a century of work by Egyptologists has demonstrated the importance of studying rock art to better understand the formation of the Egyptian state during Late Predynastic/Early Dynastic transition, c. 4400–2650 BCE (e.g. Černý 1947; Clayton 2003; Couyat and Montet 1912; Darnell 2002, 2009; Fakhry 1952; Field 1955; Gatto et al. 2009; Hendrickx et al. 2010, 2012; Huyge 1998, 1999; Judd 2009; Morrow and Morrow 2002; Murray and Myers 1933; Parker and Burkitt 1932; Robinson 1934).

Despite the magnitude of this work, situating Upper Egyptian rock art assemblages within the same temporal context as Egyptian state formation is not a simple matter. Indeed, the paucity of stratigraphic deposits (Davis 1978) and the rarity of organic patination conducive to carbon-14 dating (Huyge et al. 2001) have largely prohibited the establishment of absolute dates for Upper Egyptian rock art (Davis 1978: 216; 1984: 81–82). Therefore, the temporal placement of Upper Egyptian rock art is frequently based on the direct comparison of rock art motifs such as 'boats', anthropomorphs and zoomorphs with Predynastic iconography on pottery produced during the Naqada I and Naqada II periods, c. 3900–3300 BCE (Berger 1992: 107–109; Davis 1984: 82; Huyge 1984: 231–232). Because such chronological parallels may not always be accurate (Davis 1978: 216; Muzzolini 1999: 50), it has also proven useful to relatively date Upper Egyptian rock art by using superimposition (Huyge 2002) or by comparing representations of different animal species — e.g. 'elephants, giraffes, antelopes and cattle' — to either the ecological conditions necessary for their survival (Parker and Burkitt 1932: 250) or the zooarchaeological evidence for their domestication (Davis 1984: 83–84). Such comparisons can provide tentative maximum dates for the rock art motifs of Upper Egypt. For example, the ecological conditions of north Africa could not support elephants and giraffes prior to 8000 BCE; while cattle were not domesticated until 5000 BCE (Davis 1984: 87, 216). Unfortunately, the chronological placement of many Egyptian fauna is not always easy to define with great precision. For instance, recent analyses of faunal remains at the Predynastic elite cemetery in Hierakonpolis suggest that some wild species like the aurochs and the hippopotamus may have been imported into Upper Egypt from Lower Egypt well after environmental conditions became less than ideal for these animals (Linseele et al. 2009: 123–124).

As was mentioned previously, a great deal of the rock art located in the wadis and eastern mountains of Upper Egypt and Lower Nubia has been linked to the Predynastic period on the basis of iconographic comparisons with Naqada I and Naqada II pottery (Bard 1994; Graff 2009; Huyge 1998; Judd 2009). It may be worthwhile, then, to examine some of the most common motifs identified through these comparisons and examine their relationship to the states forming in Egypt during the Predynastic period. To begin, it should be noted that while the presence of hieroglyphic scripts has been used to pin down the date of some Upper Egyptian rock art sites to either the Old Kingdom or the New Kingdom (Couyat and Montet 1912; Judd 2009; Regulski 2008), Predynastic rock art compositions do not contain recognisable hieroglyphic inscriptions. It also appears that the Neolithic period (Červiček's A-horizon) of Upper Egyptian rock art ended well before the advent of spiral designs, curvilinear designs, individualised handprints and cattle representations which also characterised Naqada II decorated ware (Červiček's B-horizon) (Červiček 1992: 44–45). Among these, representations of 'animals' and 'boats' are the most common 'recognisable' motifs at Upper Egyptian rock art sites (Hardtke 2013: 104–105; Judd 2009: 14–19; Berger 1992: 107; Winkler 1938: 26–28).

A number of researchers have focused on the representation of animals in the Predynastic petroglyphs of Upper Egypt (e.g. Hardtke 2013; Hendrickx et al. 2009; Huyge 2002; Judd 2007, 2009). According to their surveys, the most common fauna depicted in the rock art are 'hippopotami, crocodiles, elephants, giraffe, dogs, ostriches, cattle, antelope, Barbary sheep, ibex and wild asses'. Cattle, in particular, are shown in great detail, with deformed horns, udders and spotted hides (Červiček 1992: 45; Field 1955: 25; Judd 2007: 65–69; Morrow and Morrow 2002: 182; Parker and Burkitt 1932: Fig. 2). Some animals are also

shown being hunted by men using bows and arrows, spears, swords or throwing-sticks; while others are shown being held by men using ropes or their hands (Morrow and Morrow 2002: 166, 243). These motifs were widespread in the Sahara at the time and may be indicative of a shared pastoral lifestyle (Smith 1968: 21). More recent research in Egypt's Western Desert indicates that hunting was also an important element of elite behaviour and intended to confirm the social status of the hunter, possibly as a symbol for military victory (Hendrickx et al. 2009: 230–231; Hendrickx 2011: 247). At Hierakonpolis, the archaeological evidence indicates that Predynastic (Naqada I to Naqada IIB) rupestrian depictions of 'elephants, Barbary sheep and hippopotami' took part in the same 'hunting scene' symbolism as their counterparts on various palettes and decorated pottery vessels from the elite cemetery at the site (Hardtke 2013: 112). Many of these animals were also buried in the cemetery and do not appear to have had any economic importance (Linseele et al. 2009), confirming that hunting these species was an important prestige activity in Predynastic culture, as it continued to be during Dynastic times (Hendrickx 2010; Wengrow 2006).

Although much has been made of the possibility that boat images in Upper Egyptian rock art represent the water vessels of Mesopotamian peoples, further examination of their modes of representation — e.g. the presence of 'standards' and sickle-shaped morphology analogous to the images of boats depicted on Naqada II mortuary pottery and the paintings in Tomb 100 from Hierakonpolis — indicates that these 'ships' were of local provenience (Hoffman 1979: 243–247; Wilkinson 2003: 69) and some probably dated to the Predynastic period (Murray and Myers 1933: 129–130). However, the archaeological evidence also points to a continuum of boat representations that includes the square hull designs characteristic of the Early Dynastic period (Huyge 1984: 233) and New Kingdom vessels with central masts (Morrow and Morrow 2002: 105; Judd 2009: 81). Because many of these images are not always found near water courses or routes but are sometimes associated with 'animals' and 'hunting scenes' (Judd 2009), attempts to interpret the meaning of the 'boat' petroglyphs have often focused on reconstructing their underlying cosmological symbolism rather than their pragmatic function. For example, Červiček (1998: 110) asserted Predynastic boat images prefigured boat motifs in the pyramid texts of the first half of the 3rd millennium BCE, thereby connecting these boat representations with later Egyptian ideologies concerning the fate of the dead, solar barques and sun worship in Egypt (van Hoek 2009). At rock art sites such as El-Kab, 'boats' are also associated with 'giraffes' and 'wild asses' (Huyge 2002: 199). 'Giraffes' most frequently face west; while the 'asses' generally face east. On the basis of direct historical comparisons with the pyramid texts and iconographic parallels with Early Dynastic ceramics from Abydos, this pattern could be interpreted to signify that giraffes functioned as 'bearers of the sun'; while the asses attempted to stop the sun on its journey across the sky (Huyge 2002: 200). Unfortunately for both of these interpretations, there is very little evidence for a solar cult in Predynastic Egypt apart from a few C-ware depictions of the sun between triangles serving as symbols of mountains (Graff 2009: 198). Instead, the close relationship between boats and hunting scenes may suggest that they played an important function in rituals of rulership or as status markers. This interpretation is supported by the Late Predynastic/Early Dynastic petroglyph from Gharb Aswan which depicts a 'royal procession' in connection with five 'boats' and a number of 'animals' (Hendrickx and Gatto 2009: 148–149). Another petroglyph from Nag el-Hamdulab (Aswan) portrays a similar scene but with attendant 'prisoners' surrounded by 'bowman and solar symbolism', simultaneously recalling Predynastic 'hunting scenes' and foreshadowing later pharaonic imagery of military domination (Hendrickx et al. 2012; Hendrickx et al. 2010: 308).

Put together, the Predynastic motifs observed in Upper Egyptian rock art are part of a long-term historical shift, also seen in the transition from Naqada I and II material culture (Bard 1992, 2000) to Naqada III wares of the Protodynastic period (Ciałowicz 2008). In part, these changes reflect a movement away from a pastoralist ideology with little status differentiation towards a greater concern with hunting scenes and the ritual use of boats as expressions of status and prestige. They also reflect the complex socio-political relationships that accompanied state formation in Egypt. A number of scholars have noted that early Egyptian state formation coincided with increasing stratification and craft specialisation in the Naqada culture of Upper Egypt, possible colonisation of Lower Egypt by Upper Egypt, and significant population shifts between rival polities throughout the region (Bard 1994: 265–271; 2000: 61; Ciałowicz 2008: 512). With the rise of elites during the Predynastic period, especially Naqada IIc/IId, social and economic interaction between Upper and Lower Egypt seems to have become more intense, involving the assimilation of Naqada cultural identity in Lower Egypt possibly through coercion (Buchez and Midant-Reynes 2011; Ciałowicz 2008). Given these macrosocial changes, it is interesting to note that by the transition to the Protodynastic period (Naqada III), the artists of rock art sites like Nag el-Hamdulab seem to have appropriated earlier Predynastic themes such as elite hunting and ritual boat processions and incorporated new motifs emphasising explicit military dominion and the solar cult.

Mesopotamia

In comparison to the large amounts of evidence for rock art use in Predynastic Upper Egypt, there is meagre evidence for rock art production in Mesopotamia. While unexpected, given the ubiquity of rock art around the world, the absence of rock art in Mesopotamia can be

explained by the lack of suitable rock surfaces in the marshy lowlands surrounding the Tigris and Euphrates Rivers (Maisels1993: 50–51). This is not to say, of course, that the early states of Mesopotamia did not produce rock art. If we take a broader view of the regions which constitute 'Mesopotamia', then the evidence for rock art increases significantly. For instance, even though the Greeks first coined the term 'Mesopotamia' to refer to the lands located between the Tigris and Euphrates Rivers, there is documentary evidence from Babylonian tablets that indicates this territory had its own ethno-geographic designation early on (Finkelstein 1962: 73, 77). Archaeological evidence also shows that there are good reasons for expanding the term 'Mesopotamia' to encompass the area circumscribed by the Zagros Mountains, the Arabian massif and Taurus Mountains. First, the finds at Tell Mardikh (i.e. Ebla), Mari and Tell Chuera, among others, indicate that there was a great deal of cultural continuity between regions surrounding the Taurus Mountains and the urban centres of southern Mesopotamia (Buccellati and Kelly-Buccellati 1977: 1). Second, the so-called Uruk Expansion (c. 5th–4th millennium BCE) incorporated much of the Near East — from Anatolia and Syria to Iran and the Arabian gulf — into a large-scale trade network through the establishment of a series of southern Mesopotamian outposts and colonies in those regions (Oates 1993: 403; Potts 1993: 379; Yoffee 1995: 286–288). As a result, by the 3rd millennium BCE, many of the areas surrounding southern Mesopotamia were not cultural hinterlands but had developed complex technologies, phonetic scripts (often based on cuneiform technologies) and very large urban centres (Potts 1993: 379–380). Given the widespread scale of early state formation in what can be called 'Greater Mesopotamia' (Wright and Johnson 1975: 268), it seems appropriate to expand our investigation of rock art use among the early Mesopotamian states to include sites located within south-eastern Anatolia, Syria, western Iran and the Arabian gulf region.

Within this broader territory, rock art sites abound. However, not all of these rock paintings and petroglyphs can be chronologically related to the period of early state formation in Greater Mesopotomia, c. 3500 BCE (Wright and Johnson 1975: 274). Apart from recent attempts at direct-dating (Bednarik and Khan 2005), Greater Mesopotamian rock art presents archaeologists with few opportunities to assign credible dates. Thus, the relative dates of these sites is often determined through comparisons of their styles with the iconography of Greater Mesopotamian material culture, such cylinder seals, bas-reliefs, weapons and stone sculptures (Debevoise 1942: 78–79; Murad 1980: 239–240). Another option is to compare the literal depiction of animals and technology with their better-known and dated appearance in the archaeological record. In the case of Arabian rock art, for instance, the depiction of bows and 'hunting dogs' fixes the maximum date of the motifs to the post-Mesolithic period; while depictions of cattle appear to be associated with climatic shifts towards a more moist environment, c. 4500–2800 BCE and again c. 1500–1000 BCE (Nayeem 2000: 32–33). From this perspective, the Arabian Peninsula and Iran are the only parts of Greater Mesopotamia to contain rock art that may be contemporaneous with the development of early states (c. 3rd millennium BCE to early 1st millennium BCE) (Anati 1968a: 178, 1968b: 76, 1970: 100; but note that Anati's rock art chronology has been refuted by direct dating, Bednarik and Khan 2005). By contrast, depictions of horses in the rock art of Hisma in southern Jordan can only be dated minimally to the much later Nabataean period — during which horses were first bred in the region (Simkins 1993: 105). Likewise, the Assyrian petroglyphs and inscriptions of south-eastern Turkey, found at sites such as Cudi Dag, Birklin and Ferhatli, date to the first half of the 8th century BCE (Tasyürek 1975: 169–180). Probable Neo-Assyrian chariots associated with the Thamudic B script of the 8th through the 6th century BCE are also depicted in the rock art of north-western Arabia (MacDonald 2009). Finally, in parts of Iran, there is a total lack of rock reliefs from the late 3rd millennium BCE to the 8th century BCE (Debevoise 1942: 83–105). Beginning with the 8th century BCE, petroglyphs reappear and incorporate motifs and inscriptions from later Mesopotamian states — e.g. the Behistun petroglyphs are associated with the Persian Empire during the reign of Darius (519 BCE) (Olmstead 1938). Stylistic comparisons between petroglyphs and reliefs in the Shaivand region, moreover, suggest that its rock art was produced by the Elymaian peoples as late as the end of the 1st century CE (Mehrkiyan 1997: 70–71).

When examining Iranian petroglyphs attributed to the 3rd millennium BCE, however, it is evident that there was a great deal of interaction between the Elamites and the peoples of Mesopotamia. Based on the nature of the cuneiform inscriptions and the motifs found on Elamite rock art, there appear to have been several forms of interaction between Elam and Mesopotamia. First, the rock art sites of Kurangûn and Naqsh-i-Rustam depict the introduction of Mesopotamian religious beliefs into Iran (Debevoise 1942: 78–79). Both sites contain images of 'snake gods' bearing classical Mesopotamian symbols like the horned cap of divinity and a vase with streams of overflowing water (Black and Green 1995: 98, 184). In all likelihood, these reliefs depict Nirah, a snake god worshipped in the city of Dēr, located along the Elam-northern Mesopotamian frontier (Black and Green 1995: 166). Second, the petroglyphs identified near Qasr-i-Shirîn and on the cliff-side of Darband-i-Gawr contain reliefs commemorating the victories of Mesopotamian kings. For instance, the petroglyphs of Qasr-i-Shirîn contain images of the victorious Annubanin, King of Lullubi, while those found on the cliff-side of Darband-i-Gawr, situated near the village of Sheikhân, commemorate the achievements of Naram-Sin, c. 2500 BCE (Debevoise 1942: 80–81). Based on a consideration of apparent iconography and

associated cuneiform inscriptions, the 3rd millennium rock art of Iran seems indicative of the fragmented nature and fragility of the expansion of Mesopotamian political-economic influence on other parts of Greater Mesopotamia (Yoffee 1995: 288). Simply put, there does not appear to have been a uniform cultural influence on either the political structure or the religious institutions of the Elamite peoples of Iran.

Since Arabian rock art contains the only other example of petroglyphs and pictograms within Greater Mesopotamia, it is also worthwhile to search for cultural associations between Arabian rock art images and the iconography and technology of southern Mesopotamia. For instance, initial examinations of the Jabal Qara rock art complex in far-southern Saudi Arabia appeared to show such linkages. For instance, many of the anthropomorphous figures at this site complex are depicted using 'throwing sticks' or 'boomerangs' — weapons which were also typical of both Predynastic Egypt and southern Mesopotamia during this time period (Anati 1968b: 73). However, nearly identical throwing sticks are depicted only on reliefs from the Mesopotamian city of Lagash. Likewise, over 70% of the anthropomorphous figures at the Jabal Qara complex (one of which has been direct-dated to only 2109 + 254/ -534 years BP; Bednarik and Khan 2005: 66) are shown with 'daggers' characterised by a broad lunate pommel (Anati 1968b: 74). Such daggers are only found in Anatolia, Syria and the city of Ur in southern Mesopotamia during the 3rd millennium BCE (Nayeem 2000: 502). However, recent re-analysis of the petroglyphs has determined that most post-date the 2nd millennium BCE (Bednarik and Khan 2005: 66), implying that drawing cultural associations from such isolated cultural traits can be dangerous without proper chronological controls. Nonetheless, some Arabian rock art does appear to have late pre-Historic, possibly Bronze Age associations, such as the painted bovines and square-filled dots from the largest rockshelter (JQ-34) at Jabal Qattar (Jennings et al. 2013: 675). At the Bronze Age site of Bir Himā 2, near the Najrān/al-Ukhdud site, a number of petroglyphs have also been reported (Charloux et al. 2008:14–15). It is unfortunate, however, that it is not possible to more accurately determine the age of these sites or their exact relationship to the emerging Mesopotamian states to the north. It is just as likely that these southern Arabian Bronze Age rock art sites were part of a wider cultural sphere involving contemporary communities in Egypt, the Horn of Africa and the Levant (Newton and Zarins 2000). For now, some of the better evidence for such a cultural connection comes from the Emirates of the Arabian gulf where stone-built tombs at the site of Hili contain door-stones with petroglyphs depicting two 'beasts of prey' attacking a 'gazelle' — a motif commonly found in the iconography of Mesopotamian seals (Nayeem 2000: 402).

Because of these problematic cultural, chronological and geographic linkages between Arabian rock art sites and the first states of Mesopotamia (c. 4th–3rd millennium BCE), it has not been possible to unequivocally demonstrate the nature of the cultural relationships, if any, between these two regions. For instance, although they are ubiquitous throughout the Arabian Peninsula (Khan 2002), apart from similar dagger-like designs at some sites, anthropomorphous figures from this region do not appear to have been depicted with the same iconography as Mesopotamian reliefs or sculptures and, in fact, are much more recent in chronological terms (Bednarik and Khan 2005). In this light, the differences between the two regions become much more apparent. One common interpretation of Arabian anthropomorphous rock art, based on ethnographic analogies, is that it depicts the deities prevalent during different time periods but which bear no similarity to Mesopotamian gods and goddesses (Nayeem 2000: 327–328). In other cases it has been argued that the anthropomorphs actually depict adorants praying or displaying a ritual attitude with half-upraised arms (Khan 2002: 62; Nayeem 2000: 335). Mesopotamian temple reliefs, by contrast, show that people knelt in worship (Black and Green 1995: 29, Fig. 20).

Like the rock reliefs of Iran, it seems that the petroglyphs of Arabia show the unevenness of cultural interaction during the period of the Uruk Expansion. Some common images, linked to Mesopotamian cylinder seals, appear at sites like Hili that were located along trade routes that extended from Dilmun (Bahrain) into the Arabian Gulf region (Possehl 2002). Bronze Age rock art sites are also known throughout Saudi Arabia, such as Bir Himā 2 (Najrān) and JQ-34 (Jabal Qattar), but their relationship to Mesopotamia remains ill-defined. Thus, although the Uruk Expansion may have been partly responsible for the development of early southern Mesopotamian states, processes of early state formation appear to have been much more complicated among the early state societies of Iran and the Arabian Peninsula. In these regions, especially Arabia, the rock art suggests that contact with emerging states in Mesopotamia, the Indus valley, Egypt, and the Levant may have had significantly different political, economic, religious and ideological impacts. More research needs to be done, however, in order to determine the nature and extent of these complex socio-cultural relationships.

The Indus River valley

Echoing the state of rock art evidence in Greater Mesopotamia, the situation along the Indus River in south Asia presents archaeologists with a large number of rock art sites demonstrating geographic contiguity with areas of early state formation but lacking the necessary chronological and cultural associations (e.g. Bandini-Konig et al. 1997; Gordon 1956; Jettmar 1982, 1988, 1991; King 1940; von Hinueber 1989). That is, there are many rock art sites located within the expansive geographic territory associated with the Harappan or

Indus civilisation (2500–1900 BCE) — i.e. the plains of the Indus valley as far west as the modern Pakistan-Iran border to as far east as the Thar Desert in Rajasthan (Possehl 2002). However, stylistic comparisons between these rock paintings and dated sculptures, ceramics and texts have shown that many Indian rock art sites of this region date to the Historic period, c. 100 BCE–1000 CE (Bajpai 1984: 72; Mathpal 1981: 17; Neumayer 1985: 78–81; 1992a: 56–57; von Hinueber 1989: 41–45), while a significant number also appear to be of either Mesolithic or Neolithic origins, based on the presence of lithic technologies at nearby rockshelters and comparisons with Navdatoli potsherds (Bhat 1981: 51; Ghate 1965: 58–59). Clearly, the chronology of the rock art assemblages of the south Asian subcontinent is neither self-evident nor rigorously established (Chandramouli 1991: 78; Neumeyer 1991: 39). How, then, are we to identify if there are any relationships between rock art usage and the Indus civilisation (Rajan 1984: 35)?

One solution to this dilemma is to extend the geographic area under consideration while keeping Indus valley cultural associations in mind. Continuing the processes of cultural and geographic expansion that developed during the Neolithic (7000–3200 BCE), the Indus civilisation participated in an extensive trading network, known as the Middle Asian Interaction Sphere, as early as the 3rd millennium BCE (Miller 1985: 39; Possehl 2002: 30–40, 215). The discovery of Indus-style seal impressions in a number of different locales clearly shows that this new economic and political configuration joined the Indus civilisation with communities from Greater Mesopotamia, the Arabian Gulf, Bactria (i.e. Afghanistan) and central Asia through the exchange of beads, stamp seals, bronze figurines, ceramics and metal artefacts (Possehl 2002: 222–226; Nayeem 2000: 411, 500). In addition to commodity exchange, the Middle Asian Interaction Sphere also involved the distribution of soft stone artefacts bearing a coherent set of motifs — e.g. combat snake designs, humped bulls, lion-headed birds, date palms, bevelled squares and whirls (Possehl 2002: 216). These motifs are significant because they originate from different regions within the Middle Asian Interaction Sphere, suggesting either the presence of an intercultural iconography or, perhaps, a shared ideology. If this is the case, it may be helpful to ask whether this middle Asian iconography/ideology had an impact on the development of the Indus civilisation and whether this influence is represented through rock art. Since the archaeological evidence for Mesopotamian-Arabian-Indus interaction is uneven (Possehl 2002: 228), I will test this hypothesis by examining Bactrian and central Asian rock art (Francfort 1992; 2002a) in order to see if there are any affinities between its motifs and the iconography of Indus valley seals and bronze figurines.

The archaeological record of interaction between the Indus valley civilisation and communities in Bactria and central Asia can be found not only through the presence of Indus beads, figurines, ceramics, stamp seals and metal artefacts in sites throughout Afghanistan, eastern Iran and Turkmenistan but also through the existence of Harappan outposts such as Shortughai in central Asia (Possehl 2002: 229–231). These areas of central Asia also contain a great deal of rock art dating from the Bronze Age to the early Iron Age (Francfort 1992: 97). What can this central Asian rock art tell us about early state formation in the Indus valley? To answer this question it is necessary to go beyond the limited Vedic and Avestic textual evidence from the fourth century CE cited by the Indo-Iranian model for interpreting central Asian rock art (Francfort 2002a: 305–311) and establish cultural associations between the literal and possible symbolic content of the rock art and the iconography of contemporaneous Indus stamp seals and bronze figures.

The first common central Asian rock art motif to be considered is the image of the Bronze Age chariot (Francfort 1992: 100). Significantly, many of the chariots are shown being pulled by oxen, not horses, suggesting that the invention and dispersal of chariots occurred before the domestication of the horse. Engravings of anthropomorphous masks are also quite common from the upper Indus valley to central Asia and may extend as far as Inner Mongolia in northern China, representing either long distance trade or large-scale migrations (Francfort 1992: 100–101). A third set of cultural correspondences is also attested to via common rock art motifs. In this case, petroglyphs found throughout central Asia, from Xinjiang, China to Bactria, share a distinct set of iconographic features: eye and beak motifs, curled animal forms, horns, antlers, 'scenes of predation', and sharp claw designs (Francfort 2002b: 68). Many of these motifs are present in both Achamenid stamp seals from Bactria (early 3rd–late 2nd century BCE) and Chalcolithic/Bronze Age Indus seals. Do these central Asian rock art motifs, then, reflect the intrusion of Indus valley material culture and imagery into central Asia or were they indigenous motifs attached to Indus valley-inspired media as interaction between these regions intensified?

In the absence of direct dating, the chronological discontinuity in the appearance of central Asian zoomorphic images on stamp seals from both regions cannot be taken as adequate evidence of any specific kind of interaction. It is therefore necessary to examine the rock art for other sources of chronological and macrosocial data indicative of inter-regional relationships between central Asia and the emerging state in the Indus valley. For instance, the presence of Indus-type wheeled vehicles (i.e. carts and chariots) is attested to in central Asian rock art and places the origin of chariots in central Asia at the beginning of the Bronze Age, late 3rd–early 2nd millennium BCE. On the other hand, horse-riding, human-modified horse bones and some central Asian artefacts appeared in Baluchistan as early as 1750 BCE (Francfort 2002a: 310). Central Asian rock art may have also influenced the techniques used to make stamp seals in both regions. All

of the stamps were treated linearly, evidenced oblique cutting and had cuneiform-like incisions, suggesting a mode of production heavily influenced by petroglyph technology (Francfort 2002b: 70). These data point to a dynamic and changing set of relationships between central Asia and the Indus valley during the Bronze Age that witnessed influences from both regions at different times.

Such interactions with the Indus valley state may not have always been linked to trade but may have also involved an element of coercion. Central and southern Indian rock paintings attributed to the Chalcolithic period (c. 3rd millennium BCE), for instance, show a sudden shift from hunting and gathering motifs (e.g. bow and arrow 'hunting scenes' and 'dancing scenes') to the depiction of 'domesticated cattle', harp-like instruments and wheeled vehicles (i.e. 'chariots' and 'carts') comparable to those used in the urban centres of the Indus civilisation (Misra and Mathpal 1979: 31; Neumayer 1985: 73–76; 1991: 59; 1992b: 71). Significantly, many of the 'charioteers' are depicted with 'swords' and 'battle-axes', suggesting both the introduction of metallurgy and the potentially violent nature of the contacts between the peoples of the Indus valley and those from the Indian subcontinent (Neumayer 1991: 42).

To summarise, Indus valley and central Asian rock art were not necessarily art for art's sake — i.e. an expression of the creativity of the artist (Khare 1984: 251). Rather, the petroglyphs and pictograms from these sites served as indicators of large-scale inter-regional relationships associated with the kind of shifts in trade, domestication and craft specialisation which characterised state formation in the Indus valley (Miller 1985: 40; Possehl 2002: 56–57) and, in the case of southern and central India, imply attempts at coercive expansion into neighbouring regions (Neumayer 1991). Even though the chronological evidence remains uneven (compare Francfort 1992 and 2002b), there are good reasons to think that many of the zoomorphic images on the Indus valley stamp seals that Possehl (2002: 122) classifies as 'fantastic' may have been partly shaped by a central Asian iconographic system that linked the urban and semi-urban communities of the Indus valley with settlements from as far away as northern China.

China

While direct evidence of Late Palaeolithic rock art has been found in southern China along the Jinsha River in Yunnan (Taçon et al. 2012), comparatively younger instances of rock art have been imputed throughout China and Tibet (Chen 2001). The rock images in these regions often portray 'hunting scenes' and zoomorphs such as 'horses, oxen, cattle, sheep, deer and elk' among many others (Chen 1995: 367–376; Wang 1995: 27–8). Some of these rock art sites such as the Lianyungang (Jiangsu) petroglyphs which portray anthropomorphous faces emanating from 'vegetal designs' (Chen 2001: 766), or the cupule designs and megalithic structures of Mt Juci in Henan (Tang 2012), have been dated to the late Neolithic period. Other rock art sites, by contrast, appear to be of Historic origin (2nd century BCE–14th century CE) and the work of minority cultural groups (Chen 1986: 91–93; Gao 2013: 26; Wang 1995: 28–29). In many cases, however, rock art sites are characterised simply as belonging to the 'early hunter period' or the 'Neolithic', based on their subject matter (e.g. Chen 2001).

The problem with such broad generalisations, however, is that they often neglect the ambiguity which characterises both the dating of Chinese rock art (Bednarik and Li 1991: 29) and the interpretation of its cultural associations. Although some northern Chinese rock art sites have been attributed to the Neolithic period on the basis of representations of extinct animals with varying degrees of success (Tang 1993), the relatively few geochronological studies that have taken place seem to confirm that many of these art works date to within the last 3000 years (Bednarik 1992; Bednarik and Li 1991). At other sites, associations with late Neolithic and early Bronze Age settlements in northern China are suggestive of a chronological connection to the emergence of the Shang Civilisation, c. 1700–1200 BCE (Chang 1980: 18; Chen 1986: 92). But without any form of direct dating to back up these temporal relationships, it is necessary to ask what other evidence can be marshalled to advance these cultural linkages.

First, it should be noted that there is a great deal of geographic contiguity between rock art sites in northern China and the geographic locus of the Shang civilisation along the middle Yellow River (Chang 1980: 10). Second, many of the rock art sites in this large region have been found to be contemporaneous with both the Shang civilisation and the preceding Neolithic period on the basis of stylistic comparisons between their iconic representations and the iconography of pottery, pottery figures, bone objects and jade sculptures (Chen 1990: 138). This situation is particularly relevant to the case of 'mask' petroglyphs found in the Helanshan mountain range in Ningxia (Chen 2001: 763; Dematté 2004: 10, Fig. 11). Comparisons of the outlined form of these 'radiant' mask and zoomorphic mask representations with the face designs on Neolithic pottery suggests that 'mask' petroglyphs were present during the late Neolithic and early Bronze Age periods, during the emergence of the Shang civilisation (Dematté 2004: 17–19). As a result, if it is possible to date rock art sites in the region of the middle Yellow River, particularly Ningxia and Inner Mongolia, to the late Neolithic/early Bronze Age periods based on their iconographic correspondences, is it possible to gain insight on the significance of these mask motifs and to understand the role they may have played in the formation of the Shang civilisation?

Ethnographic analogies suggest that one function of the 'masks' may have been to represent spirit beings, possibly solar deities (Chen 1990: 140; Dematté 2004: 20).

Another possible interpretation, based on the extension of the Neolithic Lung-shan mortuary complex into later Bronze Age communities, is that these 'masks' represented ancestors (Chang 1986: 295; Keightley 1986: 71). In this tradition, the bodies of individuals were reburied in communal secondary burials in an effort to depersonalise the dead and transform them into ancestors (Keightley 1986: 73). Once this task was accomplished, the living were only able to communicate with the ancestors via pyromancy, a divinatory procedure supported by the elites, for the emerging elites (Chang 1980: 42; 1986: 302–303). The importance of petroglyphs of possible masks for the creation of such state-supported ideologies was made clear by the discovery of outlined mask images or 'cong' from Liangzhu. More often than not, it seems these masks served as heavily schematised spirit icons (Keightley 1986: 80–81) and were thus useful as the material expression of a state ideology which associated kingship with access to ancestors through divination and sacrifice (Chang 1980: 31–42).

Another possible interpretation, not entirely exclusive of the previous view, is based on the observation that the iconography of the mask has strong ties to central Asian and Siberian pastoralist traditions during both the Neolithic and the early Bronze Age (Chen 2001: 779; Francfort 1992: 100–101). From the Altai mountains to the Amur and Usuri rivers, there was already a strong shamanic tradition that used masks, drums and other highly decorated and individualised items of material culture as status markers and often identified them as symbols of ancestors (Devlet 2001: 48–51). There is also ample evidence for the use of rock art to communicate these salient features in central Asia and Mongolia (Dematté 2004: 20). Given the ubiquity of these shamanic motifs in central Asia and Siberia and the incursion of agriculturalists into the pasture lands of the middle Yellow River region during the late Neolithic period/early Bronze Age (Chang 1980: 254), it seems plausible to claim that the mask petroglyphs were used as territorial markers or emblems of group identity. The subsequent development of shamanic religious specialists in this border region near the Yinshan and Helanshan mountain ranges (Dematté 2004: 15) may have subsequently allowed the mask motif to become a symbol of power and prestige which was then appropriated by early Bronze Age elites as part of an emerging ideology supporting their elevated socio-political status through the iconography of jade objects, bronze vessels and pottery (Chang 1986: 256–268, 317).

Mesoamerica

Although rock art is common throughout Mesoamerica, few studies of this form of cultural expression were published prior to the mid-twentieth century (Murray and Valencia 1996; Murray et al. 2003; Stone and Künne 2003; Strecker 1982). This situation has led some scholars to argue that the rock art of complex Mesoamerican societies has been largely ignored by the scientific community (Krupp 1994). But there has been a long history of scholarly engagement with the rock art of the state societies of central Mexico and eastern Central America (e.g. Bustamante 1997; López Luján and Morelos García 1989; Meyer 1939; Nicholson 1959; Noguera 1972; Stone 1987, 1995; Weber and Strecker 1980) as well as the Tarascan state of West Mexico (Acosta 1939; Mountjoy 1974).

The sheer volume of contemporary rock art studies dealing with complex Mesoamerican societies does, unfortunately, ignore one crucial issue — i.e. which of these societies were the first to form states in Mesoamerica? Several candidates have been advanced by archaeologists — i.e. the Zapotec (or Monte Albán) state in Oaxaca, the Maya city-states in the Guatemalan lowlands, the Olmec of the Mexican Gulf Coast, and Teotihuacán in central Mexico. Spencer and Redmond's most recent study (2004) is among the first to focus on locating the archaeological correlates of state-level societies in different parts of Mesoamerica — i.e. territorial expansion, administrative specialisation, a four-tier settlement hierarchy and temples. After comparing the complex societies of Oaxaca, the Maya Lowlands, the Gulf Coast, and the central Mexico, they concluded that the Zapotec state centred at Monte Albán in Oaxaca (c. 300–100 BCE) was the first complex Mesoamerican society to demonstrate all of the archaeological markers of statehood, even though both Teotihuacán and the Lowland Maya city-states developed only one to two centuries later. The Olmec were quickly excluded from consideration because there was little evidence for settlement hierarchies, military expansion or planned temples at Olmec sites in the Gulf Coast lowlands (Spencer and Redmond 2004: 193, 187). Although I accept the conclusion that the Olmec did not constitute a state, more recent settlement surveys and archaeological discoveries indicate that the Formative period societies of the Gulf Coast lowlands exhibited some of the hallmarks of early states, such as nucleated settlements and a probable writing system (Pool 2007; Rodríguez Martínez et al. 2006). Additionally, even though they are not the earliest states in Mesoamerica, both Teotihuacán and the Maya city-states constitute primary states. Therefore, I will focus this study on rock art sites associated with the Monté Alban state, Teotihuacán and the Maya city-states.

I start with the rock art of Monté Alban and the Zapotec state. Since the Zapotec state was centred in Oaxaca, it is logical to start with an examination of Oaxacan rock art (Murray et al. 2003: 190–192). Unfortunately, no Oaxacan rock art sites are securely dated although some have been stylistically related to the Ñuiñe style of the Mixtec Baja (c. 250–800 CE) (Rincón Mautner 1995). As a result, Murray et al. (2003: 190) form the impression that most of the Oaxacan rock art sites date from the Postclassic period (e.g. Winter et al. 2010). Nonetheless, there are a number of sites in the vicinity of Oaxaca that bear Zapotec cultural

material that can be linked to the Late Formative and Early Classic periods (c. 300 BCE–300 CE). For instance, the Texcalpintado site in Morelos contains white anthropomorphous figures rendered on a red stone substrate. Many of the figures depict the use of common Classic period Mesoamerican material symbols such as headdresses, three-point crowns, rain god visages and bird-masks (Espejo 1945: 173–174). However, the fairly uncommon use of owl-like designs suggests a cultural connection with early Zapotec communities, who used depictions of owls as day-name glyphs in the 260-day sacred calendar (Espejo 1942: 175; Marcus 1992: 128). Another example of a Zapotec day-name, possibly a crocodile, is found on the engraved boulders of Finca Las Palmas in the state of Chiapas (Weber and Strecker 1980). Within the central valleys of Oaxaca, the site of Dainzú provides the most extensive evidence of petroglyph-use in the Zapotec state (Berger 2011; Bernal 1968, 1973; Bernal and Oliveros 1988; Orr 2003). Dated to the Terminal Formative period (200 BCE–200 CE), this large civic-ceremonial centre was part of the emerging Monte Albán state and contained over sixteen monumental structures, including a ball court. Over forty low-reliefs were discovered on slab-like stones and boulders in one of these complexes. Initially identified as representing nobles taking part in a ritual ballgame (Bernal 1968; Orr 2003), archaeological consensus appears to be shifting towards the view that these reliefs may represent scenes of actual warfare (e.g. Berger 2011). Finally, Zárate Morán (2003: 163–166) has detected a number of painted rockshelters, such as Dani Guchi in the Isthmus of Tehuantepec, dating to the Monte Albán II period (c. 200 BCE–100 CE). Many of these localities in southern Oaxaca contain pictograms depicting both Zapotec place-names and day-name glyphs. What can be made of these different strands of evidence concerning rock art use by the Monte Albán state? For one thing, the association of calendar glyphs with early Zapotec rock art may indicate that it was part of a larger iconographic context in which Zapotec writing, a key aspect of state formation, may have developed (Marcus 1992: 70). This is a potentially important connection because Zapotec writing was used to differentiate the speech of lords and nobles from the vernacular used by commoners and therefore highlighted status differences in the Zapotec state of Monte Albán (Marcus 1992; Urcid 2001). It is intriguing to note also its possible relationship to depictions of warfare. A similar iconographic display is observable among the so-called 'danzante' sculptures at Monte Albán and has been used as evidence to indicate that the Zapotec state was an expansionistic, predatory state (Marcus and Flannery 1996: 195–199).

In contrast to the relatively scarce rock art sites characteristic of the Zapotec state, central Mexico boasts an extensive array of pecked crosses, squares and circles associated with the Classic period urban civilisation of Teotihuacán (c. 200 BCE–700 CE). Many of these designs are found on the monumental structures and pyramids of Teotihuacán as well as the surrounding rock outcrops (Aveni 2005). Although there is no evidence indicating that pecked crosses were part of a pan-Mesoamerican graphic tradition, similar designs have been found in Early Classic period urban centres in other parts of the region, such as Chalcatzingo in Morelos, coastal Oaxaca, Xihuingo in Hidalgo and Uaxactun in the Maya lowlands, where they are often accompanied by other petroglyphs or pictograms (Aveni 1989; Aveni and Hartung 1982; Aveni et al. 1978; Ruggles and Sanders 1984; Zárate Morán 1986). At Chalcatzingo, for example, a pecked cross petroglyph is situated at the base of a mountain, Cerro Delgado, which also contains caves with painted murals which coincide with those found in the residential structures of Teotihuacán (Apostolides 1987). The presence of these petroglyphs at these sites is significant, given the fact that Teotihuacán is one of the few early states to develop without an easily recognisable written tradition (Cowgill 1997; Langley 1991; Taube 2000). The pecked crosses may therefore have served as an alternative notation system which used conventional signs to convey religious and political ideas (e.g. Lambert 2011; Langley 1991). Several decades of study have revealed no single function for these designs (Aveni 1989: s109). Their presence on the floors of ceremonial buildings at Teotihuacán suggests that pecked crosses and circles were used to orient monumental architecture (Aveni 1989: s100–101), although there is also evidence that indicates they were placed in the buildings after construction (Ruggles and Saunders 1984: 106). Many pecked cross designs were also created by engraving holes large enough to hold wooden markers, leading some to surmise that they may have functioned as calendrical counting devices (Aveni 1989: s103). If their social function remains mysterious, the cultural meaning of these petroglyphs is even more so. One popular interpretation, based on a comparison of Mexica folklore with the ubiquity of pecked crosses on rock outcroppings, argues that the crosses served to indicate places where nature spirits dwell (Krupp 1994: 53). While this interpretation is certainly plausible, its basis on the direct historical method renders it dubious because of the lack of cultural continuity between Teotihuacán and the much later Mexica state. It seems more likely, given their association with both urban areas and rock outcrops, that pecked crosses and circles were material instantiations of Teotihuacano worldviews concerning the landscape of central Mexico (Murray and Valencia 1996: 194–195). If this interpretation is correct, then the pecked crosses of central Mexico were not only associated with Teotihuacán but were instrumental in conveying cultural ideologies connecting its urban building programs, ceremonial architecture and rural hinterlands within a sacred geographic tradition (Headrick 2007). As such this form of rock art appears to have played a role in the initial growth of the city c. 1 BCE–200 CE and, possibly, its later relationships with other Mesoamerican powers such as the Maya, c.

200–300 CE (Cowgill 1997: 133–135).

Like the pecked crosses of central Mexico, hieroglyphic inscriptions and archaeological remains demonstrate that the lowlands of southern Mexico and eastern Central America were also characterised by a regional system of rock art production associated with the Maya city-states from the Late Formative period (400 BCE–300 CE) to the Postclassic period (900–1500 CE) (Stone and Künne 2003: 198–199). In the Maya case, however, rock art occurred in the form of both petroglyphs and pictograms located in the numerous caves and cenotes which dot the region (Brady and Prufer 2005; Stone and Künne 2003; Strecker 1977; Thompson 1959). But what was their cultural significance and what role did they play in the formation of Maya city-states? To answer these questions, it is necessary to consider the styles in which Maya rock art is rendered in relation to archaeological evidence, ethnographic analogies and literary evidence from the hieroglyphic texts found in these caves. To begin, it appears that Maya caves were a central feature of social and economic life. They served as sources of both water and clay (Sayther et al. 1998: 97). As such, they were essential ecological resources for the development of urban centres, cultic activities and craft specialisation (Rathje 1971: 279–283). Indeed, many Maya centres developed around cave sites or created their own pseudo-caves (Brady and Prufer 2005; Sayther et al. 1997). Although it is clear that the ecology of the Mesoamerican lowlands limited sociopolitical integration of Maya city-states (Pyburn 1997: 159–60), caves such as Loltun appear to have provided Maya elites with the perfect setting for their ritual activities as early as the Late Formative period (Andrews 1981; Grube and Schele 1994). Strecker (1983: 129–131), for instance, has found that much of Maya zoomorphic and anthropomorphous cave art was rendered in a skeletonised style, perhaps indicating that these figures were death emblems. Similar styles of representation were found on a stela from Xpostanil, near San Simón in the Yucatan Peninsula and on plaster reliefs in the inner building of Mayapan's castillo (Prem 2001: 55). Furthermore, the hieroglyphic inscriptions in many of these caves, like Naj Tunich for instance, show that they were pilgrimage sites for the elite and that they were associated with the notion of a sacred underworld as represented in Postclassic literary works like the *Popol Vuh* (Stone 1995; Stone and Künne 2003).

The power of these caves as pilgrimage sites continues to be attested to among contemporary Lacandon Maya (Stone and Künne 2003: 208). Interestingly, Maya lords also seemed to have used cave art as a way to signify social status differences. Epigraphic evidence from Actun Kava, for instance, shows that the iconographic representation of zoomorphs at this unique site — e.g. 'dogs, monkeys and bats' — was done in a much more simplistic vernacular style with dark-brown clay pigments taken directly from the cave, suggesting that the cave was used by commoners (Sayther et al. 1997: 101). In sum, then, it appears that Maya rock art served as the material instantiation of Maya political ideologies which attempted to link their power with exclusive access to both sacred and material resources (Houston and Stuart 1996: 308–309; Stuart 2010: 286–296).

The central Andes

In contrast to the gradual processes of state formation found among other early states, the emergence of state-societies in the central Andes, or the area between southern Ecuador and northern Chile, was both rapid and discontinuous (Isbell and Silverman 2002: 15; Stanish 2001: 43). For example, during the late Preceramic period (2700–1800 BCE), Andean sedentary communities lacked pottery but maintained large populations and monumental architecture-building programs using maritime resources (Burger 1989: 50; Stanish 2001: 45–48). A little more than a millennium later, during the Early Intermediate period (c. 500 CE), societies with all of the hallmarks of early states — i.e. large settlements, irrigation agriculture, monumental architecture, pottery and metallurgy — developed throughout the Andean region (Stanish 2001: 53–55). This discontinuous and complex social evolutionary pattern of massive population movements, changing regional cultural traditions and the development of complex states coupled with the general lack of absolute chronological data for rock art in the Andean region (Strecker 2006) highlights the urgent need for adopting a broad-based contextual archaeological approach to the relationship between rock art and early states.

One way to identify the cultural association of Andean rock art sites is to draw chronological and stylistic connections between individual rock art assemblages and more securely dated archaeological sites. Rock art researchers have, for instance, established relative chronologies by comparing the style of zoomorphic rock art representations of 'felines' and 'camelids' with their appearance on ceramics or in the archaeological record (Lewis 1995: 180; Hyslop 1977: 53; Málaga 1978: 371). As was the case with Chinese and Upper Egyptian rock art sites, such comparisons have allowed for the identification of both the minimum and the maximum dates for Andean rock art production. Using this method, rock art assemblages bearing depictions of human beings with 'llamas', for instance, can be dated to no earlier than 4000–3500 BCE — the period during which llamas were first domesticated (Burger 1989: 49–50; Querejazu Lewis 1995: 185; Ritter 1994: 70). So far, stylistic comparisons between rock art and the iconography of local ceramics, textiles, obelisks and geoglyphs have offered archaeologists the best opportunities for identifying both the temporal context and the cultural associations of different Andean petroglyphs and pictograms (Falcón and Suarez 2009; Ritter 1994; Strecker 1996).

From this perspective, several central Andean rock art sites — e.g. Alto de las Guitarras (Guffroy 1999; Kaulicke et al. 2000: 25), Llave Chico (Querejazu Lewis 1995: 180), Toro Muerto (Guffroy 2003: 222)

and Lungumari Puntila (Parkman 1994: 40) — have been tentatively linked to two time periods associated with early state formation in the central Andes, the Early Horizon period (900 BCE–200 CE) and the Early Intermediate period (200-600 CE). The dating of theToro Muerto rock art site, however, remains controversial (Linares Málaga 1993). Van Hoek (2003), for instance, argues that most of the images can be linked to the Chuquibamba culture (1200-1500 CE). Many of the Early Horizon period rock art sites feature anthropomorphs analogous to Paracas, sometimes Moche pottery figures, e.g. sun heads, bowed arms, bent knees and rectilinear bodies (Kaulicke et al. 2000: 25; Ritter 1994: 70–71). At times, Formative period rock art sites may also be linked to Chavinoid iconography detailing feline zoomorphs (Falcón and Suarez 2009: 331; Guffroy 2003: 224). By contrast, rock art sites associated with the Early Intermediate period tend to include cupules and incised lines (Querejazu Lewis 1995: 180; Parkman 1994: 40) and show cultural continuity with the rock art of the later Chimu-Inca periods (compare with Christie 2000a, 2000b, 2003a, 2003b; Echevarría López 2008; Echevarría López and Valencia García 2009; Strecker et al. 2008). Interestingly, no Andean rock art site has yet been linked with the Tiwanaku state (Strecker 2003: 229).

Having suggested a chronological, geographic and cultural relationship between Early Horizon and Early Intermediate period Andean rock art sites and early states in the region, what does the evidence reveal about the significance of rock art to these state-level societies? One clue to this mystery may be found in the geographic location of these sites. Central Andean rock art sites occur along trade routes or near ceremonial centres (Guffroy 2003: 222; Sharon et al. 2003: 127; Strecker 1996: 222). Such border markers are in keeping with what we know of early Andean state formation processes. The Moche, Tiwanaku and Wari states all developed in tandem with agricultural intensification, increased commodity production and the creation of exchange relationships with other states (Stanish 2001: 59). In addition to placing rock art in strategic locations along trade and communication routes, their association with ceremonial centres suggests that many of these early rock art sites could also have had religious connotations. And yet, the meaning such sites had for the people who made and used them is hard to pinpoint. Given this ambiguity, the direct historical approach can help. As I noted previously, there appears to be a degree of cultural continuity between Early Intermediate period rock art sites in the central Andes and later Chimu-Inca period sites. It might, therefore, be possible to draw parallels between Early Intermediate period rock art sites and analogous sites used by later peoples, like the Inca.

Among the Inca, rock art and geoglyphs were employed as markers along sacred trails (Christie 2000b: 32–35). They were also intended to replicate the cosmology of the Inca as it was represented through the ceque system (Christie 2000b: 41, 2003a: 152). Moreover, when geoglyphs and engraved boulders were placed in enclosures or with fountains they were intended to promote individual interaction with deities (Christie 2003b: 141). Other studies have implied a relationship between Inca rock paintings and funerary rituals, territorial markers, and pastoralist fertility rituals (Hostnig 2006: 62–63). Imperial Inca rock art may also have been deployed to demarcate areas of great economic potential, such as the Choquequirao 'llama' motifs (Echevarría López and Valencia García 2009: 222). Early Intermediate period rock art sites were likewise associated with trade routes, possible pilgrimage routes and cemeteries (Guffroy 2003: 222), suggesting they played a role in the construction of cultural landscapes that may have become intricately bound to both inter-state trading relationships and processes of state formation.

Conclusions

This, then, is the state of the evidence for the role rock art has played in the formation of early states. Given the admittedly uneven nature of the archaeological record concerning the production and use of rock art in early states, what conclusions can be drawn from this survey? I believe this brief regional survey of rock art use among early states can yield important insights into the processes of state formation and the relationship between rock art, glottographic writing and early states in terms of the transformative and expressive power of material symbolisation (Bray 2002: 349; DeMarrais et al. 1996: 16–17; Moreland 2001: 28).

To begin, even though the processes of state formation are poorly understood or highly contentious for all of the early states considered in this synthesis, the rock art evidence indicates that some processes of state formation were more important than others. The rock art of Greater Mesopotamia, the Indus valley, the central Andes, and possibly northern China, for instance, implies that the intensification of trade was a key factor in the development of early states. This view is borne out by rock art indicating the importance of trade as a way to share technology and art across regions — e.g. zoomorphic images from central Asia and the Indus valley or the masked representations of Ningxia. In other cases, rock art images, like Early Intermediate period cupule designs in the central Andes were used as signs to mark important places in the landscape such as trade routes. Ecological factors may also have played a role. Among the Maya, for example, the caverns and cenotes that served as the medium for rock art production also served as important sources of water and clay for the emerging Maya polities. Another important factor in the rise of early states was the development of politico-religious ideologies, sometimes linked to warfare, which served to legitimise the status of the emerging elite. The rock art of China, Mesoamerica and the Andes suggests that the power of the elites in the Shang, Zapotec, Maya and Andean states was intimately linked to access to

divinity, possibly in the form of ancestors. In Egypt, by contrast, the pastoralist themes of Predynastic Upper Egyptian rock art seems to have been appropriated over time to express elite status through hunting scenes and ritual boat processions (Naqada I to Naqada II) and culminated in the depiction of military conquest (early Naqada III). A similar scenario may have unfolded in Ningxia as the masked motifs of indigenous shamans were used by early Bronze Age elites to legitimate their own social status. Ironically, these masked representations may have been originally developed as a response to the intrusion of complex societies in the region. Although beyond the scope of this paper, this last observation raises an important point. If rock art sites represent the response of indigenous cultural groups to the social practices that accompanied the formation of states, then the appropriation of their rock art images by elite members of these emerging state societies may offer significant insights into the unequal social dynamics which accompanied state formation and created new subordinate (minority) groups within the state.

Besides their utility as test cases for various theories of state formation, the rock art of early states can also provide anthropologists with a clearer understanding of the relationship between state societies, various forms of writing and semasiographic systems of communication. As I noted for the Zapotec state of southern Mexico and the Maya city-states, there are numerous examples in which rock art appears to be an important medium for the writing of hieroglyphic scripts and calendrical notations. At Teotihuacán, pecked crosses and circles appear to have formed part of a complex notation system that functioned in conjunction with a less-well-known glottographic writing system (Colas 2011; Lambert 2011; Langley 1991). By comparison, Predynastic notations in Egyptian rock art are more difficult to relate to hieroglyphic writing, but early inscriptions dating to the beginning of the Naqada III period or Protodynastic period have been found at Nag el-Hamdulab (Hendrickx et al. 2010: 308–310). This observation has important consequences for how anthropologists and epigraphers view semasiography. In these cases, semasiography does not serve as an alternative form of communication but functions alongside other writing systems. The distinction appears trivial on first examination but it demonstrates the error of viewing semasiography as a parallel but unrelated system of communication compared to glottographic writing. Likewise, both the Indus and Shang civilisations, in the form of stamp seals and oracle bones respectively, demonstrate that rock art formed part of a broad system of cultural expression from which early systems of writing developed. In light of this evidence, it seems unwise to discount the importance of semasiography compared to writing in the formation of state societies. These findings suggest that it is no longer feasible to pigeonhole rock art as simplistic or innately religious (see e.g. Gelb 1969). The rock art of early states, whether in the form of petroglyphs or pictograms, was a powerful source of political legitimation, religious expression and cross-cultural communication.

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