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HISTORY | RESEARCH ARTICLE

Writ in water, lines in sand: Ancient trade routes, models and comparative evidence

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Abstract: Historians and archaeologists often take connectivity for granted, and fail to address the problems of documenting patterns of movement. This article highlights the methodological challenges of reconstructing trade routes in prehistory and early history. The argument is made that these challenges are best met through the application of modern models of connectivity, in combination with the conscious use of comparative approaches.

1. Introduction

Scholars engaging with premodern exchange tend to represent their subject as lines on a map—effortlessly crossing deserts, seas and mountains, connecting cities, harbours and continents at the blink of an eye. Such visualizations are good at showing the flow of commodities, but obscure the fact that trade routes were rarely lines and most likely never on a map. Trade routes were people with their animals or vessels, moving through landscapes, across seas and along rivers. Once they had passed, they were gone. On land, footprints and abandoned campsites might have been visible

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PUBLIC INTEREST STATEMENT

Trade is a driving force in the global economy, and among the prime agents of wealth distribution as well as cultural and political change. Historical and archaeological research has demonstrated that this is no recent phenomena, but that forerunners of the processes today labelled as globalization have been at work within all spheres of society throughout human history. While acknowledging the central role played by long-distance trade in the past, I argue in this article that scholars often take connectivity for granted, overlooking the major physical and institutional obstacles to travel in the premodern period, as well as the problems inherent to reconstructing the dynamic process of trade from the static evidence of texts and archaeological data. By insisting that scholars should not limit themselves to observing that objects moved and changed hand, but also ask how, we may not only increase our understanding of premodern economies, but also be in a position to better appreciate the nature of contemporary exchange.

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for a while, at sea not even that. Today little is left, apart from the occasional shipwreck or hard-to-identify caravanserai, themselves examples of how dynamic movement has been preserved only as static locations (Map 1).

Reconstructions of trade routes are based on a combination of finds of material artefacts, literary, documentary and epigraphic reports, and all too often considerations of probability. In some precious few cases, like the rich cuneiform archives of the early second millennium BCE expatriate Assyrian merchant community in Anatolian Kanesh (Larsen, 2000) and the records of the Medieval Jewish merchant community recovered from Cairo Geniza (Goitein, 1974; Goitein & Friedman, 2008), we are in the fortunate situation of getting information on products, people and places over a prolonged period of time. In most cases, we need to make do with two of these categories at a single point of time. We can be almost sure, however, that wine was served in Egyptian glass vessels at the banquets of the Kushan kings of Afghanistan in the first–second centuries CE, for such vessels have been found in their storerooms (Whitehouse, 2001). A young woman of probable Syrian origin was buried in Rome during the reign of Marcus Aurelius (161–180), with a doll of African or Indian ivory, and a ring with a diamond from the mines or river gravels of the Deccan (Bedini et al., 2012), very likely paid for with silver from the mines of present-day Spain (McLaughlin, 2010, p. 168, 173). We can assume that these places were in contact with each other, but how and by which routes are less clear than sometimes assumed, even when written records exist. Inscriptions dedicated by merchants show where some of them worshiped, rested and resided. Their names, the script and the language they employed can often, although not always, reveal what place they called home, but their immediate point of departure, their destination and their itinerary must be inferred. Literary accounts, sometimes explicitly and sometimes between the lines, reveal that people and commodities were on the move along certain lines at given points of time. Although such sources can be and are used in a generalizing fashion, the pictures they offer are more often than not incomplete, and there is little guarantee that the patterns of communication they describe were identical at other points of time.

This short article is intended as a methodological think piece. Empirical examples are drawn from the eastern Mediterranean, Near East and western Indian Ocean, but the aim is to address the general challenges that face modern researchers, whether archaeologists or historians, in their

Map 1. Places mentioned in the text along with important political and commercial centres in the regions discussed.

Basemap © ESRI 2014. Source: Author.
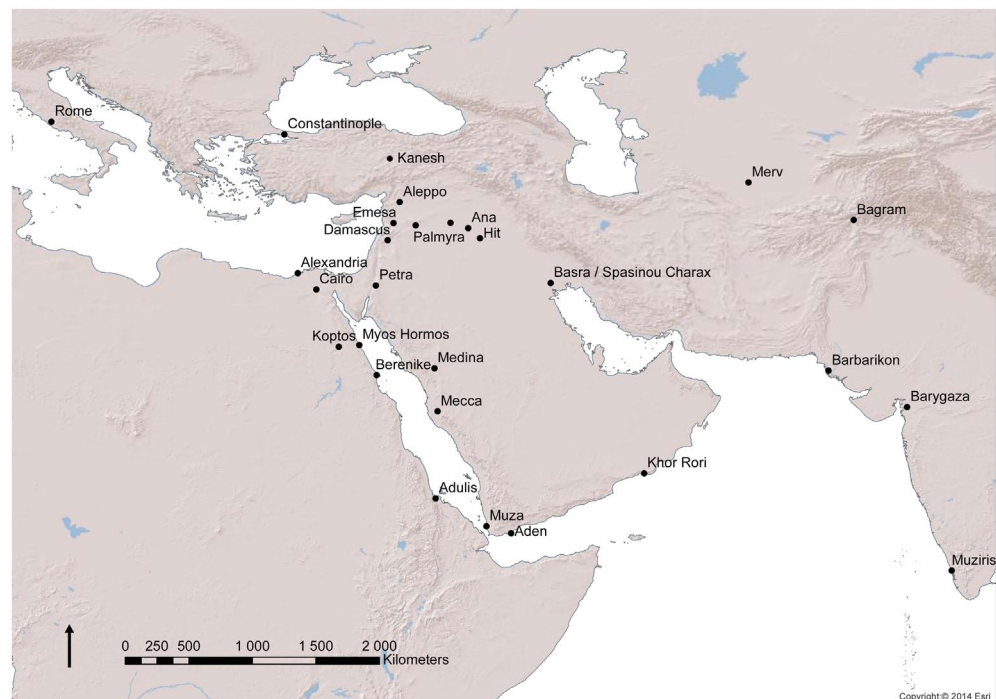
attempts to trace patterns of trade in prehistory and early history. Few answers are provided, but a call is made for interdisciplinary, theoretically based and methodologically explicit research, facilitating testability and comparability with other empirical and chronological settings.

2. Trade routes, history and archaeology

In some cases, trade routes can certainly be traced archaeologically, at least on a place-to-place basis. When excavations at Egyptian Red Sea ports of the Roman period reveal South Arabian and Aksumite ceramics (Tomber, 2012), it is quite clear how and from where they arrived—by ship from South Arabian and Aksumite ports. Onward transport to the Nile and to the Mediterranean entrepôt of Alexandria can also be reconstructed on the basis of documented infrastructure, literary and papyrological sources, along with topographical and hydrological data (Cooper, 2011; Sidebotham, Hense, & Nouwens, 2008). Other questions, some answerable, others not, remain open: Did ships move across open sea, or along one of the reef-infested coasts? Did they sail at night or anchor in the evening? Did they set sail directly for Egypt, or put in at other ports en route? At what time of year did they sail, and who were the crews? Some cases are much more difficult. Most general overviews of Rome's trade with the East, along with specialist studies on the Syrian city of Palmyra, which was important in this commerce, draw lines—in text or on maps—between Palmyra and the cities of Emesa (Homs) to the west and Dura Europos to the East (Will, 1992, pp. 83–84; Young, 2001, p. 141; Żuchowska, 2005). East of Dura, an overland route through northern Iran and into present-day Afghanistan is frequently depicted (Sartre-Fauriat & Sartre, 2008, p. 87; Teixidor, 1984, pp. 32–33). Some even place a colony of Palmyrene merchants in Merv in present-day Turkmenistan, with a corresponding line on the map westwards to Syria (Ball, 2000, p. 76). The rationale behind the proposed route to Emesa is simply proximity, and an argued close relationship between the two cities, while Dura Europos was the home of a substantial Palmyrene community (Dirven, 1999; Will, 1992, p. 83). There are, however, no sources, that indicate the involvement of the Palmyrenes of Dura Europos in the otherwise unusually well-documented long-distance trade between Palmyra, the Persian Gulf and the Red Sea, and topographical, epigraphic and geographic arguments seem to favour a more southerly route joining the Euphrates at Ana or Hit in modern Iraq (Gawlikowski, 1983, 1988). As regards the overland route through Central Asia, scholars seldom explicitly discuss the evidence underpinning their maps, but the route does rest on two pieces of evidence. The first is the Greek-language itinerary known as the *Parthian Stations*, compiled by Isidorus of Charax around the turn of the Common Era (Schoff, 1989). The problem is that although the *Stations* certainly contains an itinerary, and a series of government posts along it, trade is mentioned nowhere in the text. Modern scholarship holds that the purpose of the text was primarily military or simply geographic (Millar, 1998, p. 120; Roller, 2004, p. 218). The second authority for the overland trade route through Central Asia is a brief passage by the second-century geographer Ptolemy, who cites a certain Syrian merchant, Maes Titianus, who had sent his agents to the borders of China (Ptolemy 1.11, ed. Berggren & Jones, 2000; Bernard, 2005), an event sufficiently extraordinary to merit mention. Well-researched scholarship is of course aware that the two Palmyrene portrait busts that once conjured up a Palmyrene colony in Merv have long ago been demonstrated to have reached the region in modern times (Parlasca, 1969, p. 183, 1992, p. 258). Nevertheless, the trade route remains on the map.

3. Narratives, models and the past

The point of this criticism is not to say that traders did not move from Mesopotamia to Central Asia, or that the people of Palmyra did not visit and trade with their closest neighbours, but to show how any reconstruction of trade routes in early history is built on layer upon layer of modern assumptions, some explicit, most implicit. Writing history and archaeology is the construction of narratives of the past, based on signs that have come down to us through time (Veyne, 1971; White, 1973). This currently unfashionable semiotic terminology is invoked to serve as a reminder that whether we call these signs sources or data, we do not have direct access to the past. The lines we draw on our maps are abstractions and reconstructions of the lines once writ in water or drawn in the sand, but now long gone. This does not imply that scholars should abstain from exploring, explaining and visualizing how people and goods moved in the past, but suggests that a measure of awareness about the challenges and uncertainties involved in reconstructing ancient patterns of connectivity, and of the risk

of making assumptions about scale and regularity that are not founded in data, might not be out of place. Arguably one way of doing this is by juxtaposing historical and archaeological data with comparative material within modern theoretical frameworks. In prehistoric archaeology with its basis in material culture and close disciplinary relationship to anthropology, this has hardly been controversial, although debates over the merits of different approaches have been fierce (Dillian & White, 2010; Earle & Ericson, 1977; Johnson, 2006; Kristiansen, 1999; Yoffee & Sherratt, 1993). In classics, history and historical archaeology, the existence and authority of literary sources have favoured hermeneutical approaches, which, inspired originally by Hegel, Ranke, and later Gadamer (1965, pp. 185–204), encouraged a more cautious attitude, insisting that every past society should be interpreted on its own terms.

While few would challenge this ideal, it has arguably led to widespread scepticism, more outspoken in history than in archaeology, towards the application of modern theoretical approaches, especially from the social sciences, on the grounds that this could lead to presentism or even anachronism. In archaeology, this has found expression in criticism of processual approaches from traditional culture-historical as well as later post-processual viewpoints (Bintliff, 2011). In history, a similar development is visible in traditional historicist and positivist as well as post-modern criticism of social science history (Finley, 1986, pp. 1–6, 47–66; Iggers, 1997, pp. 66–77, 97–133).

One of the scholarly debates where this has been evident is the long-standing and arguably largely barren controversy on formalism/substantivism/modernism/primitivism with respect to the nature of premodern economies, and with parallel trajectories within classics, archaeology and economic anthropology (Bang, 2007; Cook, 1966; Finley, 1973, 1979; Frederiksen, 1975; Garnsey, Whittaker, & Hopkins, 1983; Humphreys, 1969; Isaac, 2005; Manning & Morris, 2005; North, 1977; Onorati, 2007; Polanyi, 1963; Polanyi, Arensberg, & Pearson, 1957; Scheidel & Reden, 2002). The claim that premodern economies were embedded in society to an extent that they cannot be analysed separately from their sociopolitical context, effectively cut off attempts at comparative studies with other such contexts. It led to scholarly fatigue, in the sense that by the 1990s, economic historians had turned away from the study of the ancient world, and scholars working with antiquity had more or less abandoned the study of trade, or, to be more specific, had turned it into an exercise of cultural history, debating primarily the symbolic aspects of exchange rather than the material ones (Morris & Manning, 2005, pp. 26–29). In the same period, however, many economists gradually realized that the modern economy is as much embedded in society as premodern economies were, and that this does not mean that both cannot be approached with the same set of analytical tools (North, 1990). Over the last decade, the tide has started to turn, following calls for the writing of social science history that is testable, comparative and methodologically explicit. (Morris & Manning, 2005, p. 33).

Models realize assumptions about relations between specific phenomena in the real world. In that sense all narratives about the past involve the construction of models. A broad distinction might be drawn between descriptive models, aiming at representing the past as it was—to the extent possible that is, and analytical models, that aim to explain certain aspects of the past (Meyer, 2000). Descriptive models, much used in prehistoric archaeology, for instance in reconstructions of migrations and spread of technology, can be falsified and rejected if they fail adequately to reflect the data. Analytical models, such as the formalist and substantivist approaches to the ancient economy, are simply more or less relevant and useful. Models can also be applied in descriptive or in analytical ways. Polanyi's port-of-trade model, claiming that premodern trade typically took place in small, politically independent or semi-independent polities on the edge of larger territorial states (Polanyi, 1963; Polanyi et al., 1957), has not stood the test of time as a description of early trade in general, but nevertheless offers insight into mechanisms of exchange in many places and in different periods. In this way, models can be compared to tinted lenses that obscure some aspects, but allow us to see others more clearly. Scholars such as Polanyi and Finley, important proponents of the primitivist/substantivist points of view, were also vocal advocates for the use of analytical models on past societies (Finley, 1986, esp. pp. 65–66; Polanyi et al., 1957). They just preferred a different set of tools from those offered by economic scholarship in their days, in Finley's case an emphasis on the Weberian

concept of status as the most important motivation among Greek and Roman elites rather than accumulation of wealth, and Polanyi's adoption of Malinowski's anthropological terminology of reciprocity and redistribution as a means to analyse social and economic ties within the same analytical framework (Finley, 1973, pp. 35–62; Polanyi et al., 1957). The question is not whether the distant past should be viewed through modern lenses or not—that is inevitable, as we are modern people who do not have direct access to the past—but whether these lenses, or in this context models, allow us to see aspects of that past in a different manner.

4. Routes, connectivity and networks

Are routes important? It might be argued that the crux of the matter is that goods and people moved from place to place, not by which roads they travelled. Scholars have long realized that global connectivity is not a recent development, but can be traced back into prehistory (Gills & Frank, 1993; LaBianca & Scham, 2006), with the important qualification that globalizing processes took place within the boundaries of the relevant known world, or *oikoumene*. In Horden and Purcell's *The Corrupting Sea* (2000), the Mediterranean rim is conceived as an agglomeration of interconnected micro-regions. Paths, roads, fords and crossings used in early history and pre-history might well be traced, as can imperial-level projects such as the Roman road system, but it is the multiplicity of links within and between micro-regions that stands out. Similarly, at sea, Horden and Purcell persuasively emphasize the importance of everyday cabotage and small-scale commerce between neighbouring communities, over long-distance journeys and high commerce (Horden & Purcell, 2000, pp. 122–143). Horden and Purcell's argument transfers well to the agricultural parts of the Near East, which are also part of the Mediterranean world, but arguably less so to the larger region between the Persian Gulf, Red Sea, Mediterranean and the Caucasus, that constituted the bridge between Asia, Europe and Africa; Mediterranean and Indian Ocean in the premodern period. In some ways, the steppes and deserts of Syria, Mesopotamia and Arabia resemble oceans, but in other ways they are very different. From the perspective of the agricultural rim in Syria and northern Mesopotamia, the desert needs to be crossed just like an ocean. The desert, however, was never empty. It was home to nomadic populations who controlled the infrastructure and possessed the know-how necessary in order to cross safely. Moreover, the Mediterranean, despite its great diversity, connected hinterlands with some general ecological and climatic traits in common. Trade in the Middle East, including the Red Sea and Persian/Arabian Gulf, was to a large extent a matter of transit between the ecologically very different worlds of the Indian Ocean and the Mediterranean. Although figures are lacking, it seems likely that trade in the Near East, relying on overland transport, would involve a higher proportion of low-weight, high-value goods carried over great distances than trade in the Mediterranean. Such trade was a major potential source of income to anyone who could lay claim to it—merchants, carriers, highwaymen, protectors, local communities and imperial authorities. Arguably, communities such as Roman period Palmyra and Petra owed their existence to trade, and it contributed a great deal towards the significance and prosperity of places such as Islamic period Aleppo, Basra, Cairo, Damascus and Baghdad. In this setting, routes become important because changes in the direction of trade could lead to changes in the fortunes of tribal communities, cities, states and even empires.

At the risk of stating the obvious, *connectivity* is a term describing a *state* of being interconnected, not a model explaining these interconnections. Several analytical models have been applied in attempts to operationalize connectivity in archaeology and history. Most of them are indebted to Christaller's *central place* theory, which aimed to describe the distribution and hierarchy of settlement on the basis of their *centrality*—what economic services central places of varying size were able to offer, and *gravity*—how far people would be willing to travel in order to make use of them (Christaller, 1933; Renfrew, 1977; Rivers, Knappett, & Evans, 2013). In archaeology, approaches derived from central place theory have been used to study interaction of centres of production, exchange and redistribution with their hinterlands, and to interpret settlement hierarchies (Renfrew, 1977; Verhagen & Whitley, 2012).

Central places were also the points of interaction between different micro-regions. As Horden and Purcell demonstrate, hinterlands were frequently geographically dispersed (Horden & Purcell, 2000, pp. 115–122). Also, the distance that people found it worthwhile to travel differed with the attractiveness of the goods or services they were seeking to obtain. Silk and spices, for instance, were sufficiently attractive for some individuals in the ancient world to travel the whole distance between the Mediterranean and East Asia, or, much more frequently, to travel some of the distance themselves and then pay their share of the high transaction costs connected with moving silk by way of a series of interconnected central places stretching from China to Western Europe.

Here, models of centrality intersect with network analysis. Network approaches have been used to map, measure and visualize interaction between archaeological sites, for instance in the Middle Bronze Age Aegean (MBA) (Evans, Knappett, & Rivers, 2009; Evans, Rivers, & Knappett, 2012; Knappett, Evans, & Rivers, 2008), Roman period Southern Spain (Brughmans, Keay, & Earl, 2012, 2015), the Precolumbian Americas (Borck, Mills, Peeples, & Clark, 2015; Crabtree, 2015; Golitko & Feinman, 2015; Golitko, Meierhoff, Feinman, & Williams, 2012; Irwin-Williams, 1977) and the early Medieval North Sea (Sindbæk, 2007, 2009). A major weakness of central place theory that made it difficult to apply to archaeological material is that it takes neither topography nor the variety of transport available in the real world into account. Uncritical use of network analysis would have the same limitation. It would show possible connections rather than actual connections, and thus contribute little added value compared to traditional distribution maps. Most scholars, including those cited above, will, however, to varying degrees make allowance for geography, technology and topography in their analyses. Such considerations can also be integrated into the tools applied in analyses, as the example of Rivers', Knappet's and Evans' *Ariadne* model of exchange in the MBA Aegean demonstrates (Rivers et al., 2013). Satellite archaeology, digital elevation models and ground survey offer the option of testing the optimal networks described by network models against the restrictions of the real world. In this way, interdisciplinary network analyses might yield not only possible, but also probable routes of communication. At the same time, they reveal impossible and impractical connections. Viewing central places as nodal representatives of ecologically diverse hinterlands makes it possible to identify the critical ties between micro-regions and to model interaction between them (Damgaard, 2011).

The premise that rational actors will choose the shortest, most convenient or inexpensive route of travel is also the main limitation of modelling connectivity by way of network approaches. In most cases, the assumption is undoubtedly correct, and for certain empirical settings, it might be the best that can be achieved. Historically, however, there are numerous examples that decisions on itinerary are taken on other, equally rational grounds (Seland, 2011, 2012). To return to the concepts of centrality and gravity; silk and spices were products that were sufficiently attractive to create extensive hinterlands or networks. Staple foodstuffs, on the other hand, did not hold the same attraction, and were generally drawn from the immediate hinterland, except in politically determined exceptional cases, such as the supply of the ancient imperial capitals of Rome and Constantinople (Sirks, 1991), and the Islamic period holy cities of Mecca and Medina (Mayerson, 1996, pp. 125–126). Studies of the ancient as well as the Ottoman worlds have shown how, in cases of extreme shortage, prices would soar beyond the reach of large segments of the population, who would then starve (Jameson, 1983; Marcus, 1989, pp. 123–125). Coastal communities could bring in grain by sea once the price became sufficiently high or as a result of political action to relieve the situation. Landlocked cities, such as eighteenth-century Aleppo, had to rely on neighbouring regions and were extremely vulnerable in situations of supralocal shortage (Marcus, 1989). The example of grain illustrates the significance of the political dimension. Bekker-Nielsen has applied central place theory in order to explain the urbanization of Roman period North-Western Europe. In his *Geography of Power*, the question of how far someone is willing to travel in order to make use of a certain service is complemented with the question of how near an instrument of political rule has to be in order to be effective (Bekker-Nielsen, 1989). Related approaches might be applied to the flow of trade. Rulers seek to control trade, in order to channel revenue their own way, while merchants try to minimize transaction costs. In situations where the cost of protection has to be balanced with risk of predation and cost of transportation (Bang, 2008, pp. 131–201; Steensgaard, 1974), this will in some cases cause

merchants to choose routes or means of transport that would seem suboptimal from a cost/distance point of view (Seland, 2012; Steensgaard, 1974).

5. History, archaeology and the role of ethnography: from anecdotes and possibilities to patterns of connectivity

Theoretical frameworks exist that integrate economic and sociopolitical processes, and thus allow the study of interaction between trade and political power and between rational agents with opposing interest. Taxes, tribute, interest on loans and the risk of shipwreck can all be considered in terms of transaction costs (Silver, 2011). Questions of trust and social cohesion lend themselves to principal–agent analyses (Eisenhardt, 1989). New Institutional Economics allow market exchange, extortion of protection money and piracy to be analysed as complementing economic activities. How then, can such sociopolitics be incorporated into reconstructions of premodern connectivity? One possible strategy is comparison with more amply documented empirical settings. Analogy is perhaps the most widespread, although usually implicit variety of descriptive modelling in archaeology and history (Hodder, 1982). Practices from different places or periods are used to shed light on fragmentary empirical settings. On a more general level, this approach has recently been exemplified by Peder F. Bang in his monograph on comparative aspects of trade in the Roman and Mughal empires, where the Mughal period bazaar is used as a model for the Roman economy, and by Walter Scheidel and colleagues in their edited volume on Rome and China (Bang, 2008; Scheidel, 2010). The Mughal, Chinese and Roman empires and their economies were not identical, but were all large, premodern, tributary states, and juxtaposing them shed light on their similarities as well as their differences.

In archaeology, the application of comparative perspectives has been conceptualized in the subdiscipline of ethnoarchaeology (Cunningham, 2009; Roux, 2007). Roux draws the distinction between static and dynamic phenomena, allowing the study of simple and complex correlates (Roux, 2007). Trade routes along the Indian Ocean to Eastern Mediterranean axis lend themselves to both kinds of studies. Technology (sail, camels) (Retsö, 1991; Rosen & Saidel, 2010; Whitewright, 2007a, 2007b), subsistence (settled agriculture and camel nomadism) (Retsö, 1991; Rosen & Saidel, 2010) and climatic conditions (wind systems, precipitation limits) (Beresford, 2013) remained, although not unchanged, nevertheless essentially similar from the first millennium BCE until the early twentieth century, with the advent of motorized transportation and the construction of modern infrastructure by colonial governments. This means that the environmental and technological conditions that Palmyrene merchants operated under in the first three centuries CE were not dramatically different from those faced by the young Muhammad when he took part in trading journeys from Mecca to Syria in the late sixth century, by the European merchants of seventeenth-century Aleppo, or the adventurers and explorers that followed them in the nineteenth and early–twentieth century. The latter example is important because such practices all but disappeared during the first half of the twentieth century, and can no longer be studied by means of traditional ethnoarchaeological fieldwork. European travellers in the Ottoman Empire and in the Indian Ocean, however, for all their orientalist prejudice, have left literally thousands of letters, reports and travelogues, describing the practicalities of premodern travel in these regions (Carruthers, 1929; Drijvers & Sancisi-Weerdenburg, 1991; Facey, 2004; Hachicho, 1964; Murphey, 1990; Ooghe, 2007; Potts, 1988; Seland, 2008, 2011). Many of them were also keen and acute observers of ruins and antiquities and became pioneers of archaeological research and exploration in the Near East (Ooghe, 2007). Governments of the colonial period published navigational manuals, military handbooks and geographical descriptions giving information on infrastructure and seasonality that their agents needed in order to operate in the region (e.g. Hydrographer of the Navy, 1967; Naval Intelligence Division, 1944, 1946; Thornton, Seller, Skelton, Verner, & Fischer, 1970). Stringent use of such sources in what Kalentzidou in a different context labels "historically informed ethnoarchaeology" (Kalentzidou, 2000) gives invaluable information on premodern patterns of movement; where was it possible to anchor a ship, when was the best time for sailing, how long would a typical journey take, where are the terrain suitable and the water sufficient for camels, and which areas should better be avoided. Fragmentary data from the ancient and Islamic periods can then be plotted into the more detailed map based on the late premodern period, giving the likely, although not certain, schedules and routes of ancient caravans and merchant ships

(Seland, 2008, 2011). Ship technology changes and wells dry out over centuries and millennia; nevertheless, such variables correspond to what Roux labels static phenomena, enabling the identification of simple correlates (Roux, 2007, pp. 155–157). We can be fairly certain that ancient Indian Ocean sailors followed the same schedules as those described by later navigators such as Ibn Majid in the fifteenth century and Horsburgh in the nineteenth (Horsburgh, 1841; Tibbetts, 1961), and that caravans between Aleppo and Basra in the eighteenth century followed more or less the same trails at the same pace as those between Palmyra and Spasinou Charax in the second century.

Whether comparative history or ethnographically informed of archaeology can create functional analogies for dynamic phenomena, or Roux's "complex correlates" (Roux, 2007, pp. 166–169), is another matter. Can we assume that the caravans organized by Ottoman-period merchants and authorities in cooperation with the Bedouin are useful analogies for those formed by Palmyrene merchants in cooperation with the camel-herding *skenitai* ("tent-dwellers") and Roman and Arsacid authorities (Seland, 2014)? Not by default, and certainly not in the details. The Roman period *synodiarchos* ("caravan-leader") (Will, 1957; Yon, 1998) and *strategos nomadon* ("tribal-leader"?) (Brüggemann, 2007) might have been different figures from the Ottoman *caravanbashi* and the Bedouin *sheikh* (Grant, 1937, pp. 129–131). Nevertheless, they represent people dealing with closely related organizational challenges within similar ecological, technological and arguably even political settings, and studying them in comparative light can shed light on their scope of action, their *habitus* or their independent agency.

Building arguments on analogies with practices documented in comparably recent history is a way of applying these analogies as descriptive models of practices in the more distant past. These models are testable to the extent that changes in technology, climate or political conditions can show that the implicit analogies are improbable, and their validity rests on the Braudelian analytical model of the *longue durée* (Braudel, 1958), the notion that long-term structures are more important than short-term events in shaping historical development, which has proven very fruitful for the study of premodern economic history.

Can lines writ in water and drawn in the sand long ago be discerned by modern scholars? Arguably they can, but not on the basis of distribution maps or anecdotal evidence alone. Above I have suggested that using evidence frozen as static locations, artefacts and texts to infer dynamic processes of past connectivity can be achieved by applying theoretical models of centrality in combination with models of interaction and comparative evidence. Other approaches can surely also do the job, but transparent reasoning and explicit methodology should underpin the lines drawn on the maps and satellite images of modern publications.

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References
Ball, W. (2000). *Rome in the east: The transformation of an empire*. London: Routledge.
Bang, P. F. (2007). Trade and empire in search of organizing concepts for the Roman economy. *Past and Present, 195*, 3–54.
http://dx.doi.org/10.1093/pastj/gtl031
Bang, P. F. (2008). *The Roman bazaar: A comparative study of trade and markets in a tributary empire*. Cambridge: Cambridge University Press.
Bedini, A., Ehrman, S., Cesaro, S. N., Pasini, M., Rapinesi, I. A., & Sali, D. (2012). The Vallerano Diamond from ancient Rome: A scientific study. *Gems & Gemology, 48*, 39–41.
Bekker-Nielsen, T. (1989). *The geography of power: Studies in the urbanization of Roman North-West Europe*. Oxford: B.A.R.
Beresford, J. (2013). *The ancient sailing season*. Boston, MA: Brill.
Berggren, L. J., & Jones, A. (2000). *Ptolemy's geography—An annotated translation of the theoretical chapters*. Princeton, NJ: Princeton University Press.

Bernard, P. (2005). De l'Euphrate à la Chine avec la caravane de Maès Titianos (c. 100 ap. n. è.) [From the Euphrates to China with the caravan of Maes Titianos (ca 100 CE)]. *Comptes rendus des séances de l'Académie des Inscriptions et Belles-Lettres*, 149, 929–969.

Bintliff, J. L. (2011). The death of archaeological theory? In J. L. Bintliff & M. Pearce (Eds.), *The death of archaeological theory?* (pp. 7–22). Oxford: Oxbow Books.

Borck, L., Mills, B., Peeples, M., & Clark, J. (2015). Are social networks survival networks? An example from the late pre-Hispanic US southwest. *Journal of Archaeological Method and Theory, 22*, 33–57. doi:10.1007/s10816-014-9236-5

Braudel, F. (1958). Histoire et Sciences sociales: La longue durée [History and social sciences: The *longue durée*]. *Annales. Économies, Sociétés, Civilisations, 13*, 725–753.

Brüggemann, T. (2007). Ethnarchos, phylarchos and stratêgos nomadôn in Roman Arabia (1 st–3rd Century). Central power, local administration, and nomadic environment. In A. S. Lewin & P. Pellegrina (Eds.), *The late Roman army in the near east from Diocletian to the Arab conquest* (pp. 275–284). Oxford: Archaeopress.

Brughmans, T., Keay, S., & Earl, G. (2015). Understanding inter-settlement visibility in iron age and Roman Southern Spain with exponential random graph models for visibility networks. *Journal of Archaeological Method and Theory, 22*, 58–143. doi:10.1007/s10816-014-9231-x

Brughmans, T. T., Keay, S. S., & Earl, G. G. (2012). Complex networks in archaeology: Urban connectivity in iron age and Roman Southern Spain. *Leonardo, 45*, 280–280. http://dx.doi.org/10.1162/LEON_a_00373

Carruthers, D. (Ed.). (1929). *The desert route to India being the journals of four travellers by the great desert Caravan Route between Aleppo and Basra 1745–1751.* London: Hakluyt Society.

Christaller, W. (1933). *Die zentralen Orte in Süddeutschland* [Central places in southern Germany]. Jena: Verlag von Gustav Fischer.

Cook, S. (1966). The obsolete "anti-market" mentality: A critique of the substantive approach to economic anthropology. *American Anthropologist, 68*, 323–345. http://dx.doi.org/10.1525/aa.1966.68.issue-2

Cooper, J. P. (2011). No easy option: The Nile versus the Red Sea in ancient and mediaeval north-south navigation. In W. K.Harris & K. Iara (Eds.), *Maritime technology in the ancient economy* (pp. 189–210). *Journal of Roman Archaeology Supplementary Series, 84.*

Crabtree, S. (2015). Inferring Ancestral Pueblo social networks from simulation in the Central Mesa Verde. *Journal of Archaeological Method and Theory, 22*, 144–181. doi:10.1007/s10816-014-9233-8

Cunningham, J. (2009). Ethnoarchaeology beyond correlates. *Ethnoarchaeology, 1*, 115–136.

Damgaard, K. (2011). *Modelling mercantilism: An archaeological analysis of Red Sea trade in the early Islamic period (650–1100 CE)* (PhD). Copenhagen University, Copenhagen.

Dillian, C. D., & White, C. L. (2010). *Trade and exchange.* New York, NY: Springer New York. http://dx.doi.org/10.1007/978-1-4419-1072-1

Dirven, L. (1999). *The Palmyrenes of Dura-Europos.* Boston, MA: Brill. http://dx.doi.org/10.1163/9789004295926

Drijvers, J. W., & Sancisi-Weerdenburg, H. (Eds.). (1991). *Through travellers' eyes: European travellers on the Iranian monuments.* Leiden: Nederlands Instituut voor het Nabije Oosten.

Earle, T. K., & Ericson, J. E. (Eds.). (1977). *Exchange systems in prehistory.* New York, NY: Academic Press.

Eisenhardt, K. M. (1989). Agency theory: An assessment and review. *The Academy of Management Review, 14*, 57–74.

Evans, T., Knappett, C., & Rivers, R. (2009). Using statistical physics to understand relational space: A case study from

Mediterranean prehistory. In D. Lane, D. Pumain, S. Leeuw, G. West, T. Evans, C. Knappett, & R. Rivers (Eds.), *Complexity perspectives in innovation and social change* (pp. 451–480). Dordrecht: Springer, Netherlands.

Evans, T. S., Rivers, R. J., & Knappett, C. (2012). Interactions in space for archaeological models. *Advances in Complex Systems, 15*(1), 1–20. doi:10.1142/S021952591100327X

Facey, W. (2004). The Red Sea: The wind regime and location of ports. In P. Lunde & A. Porter (Eds.), *Trade and travel in the Red Sea region: Proceedings of the Red Sea Project I. Held in the British Museum October 2002* (pp. 7–17). Oxford: Archaeopress.

Finley, M. I. (1973). *The ancient economy.* London: Chatto & Windus.

Finley, M. I. (Ed.). (1979). *The Bücher–Meyer controversy.* New York, NY: Arno Press.

Finley, M. I. (1986). *Ancient history: Evidence and models.* New York, NY: Viking.

Frederiksen, M. (1975). Theory, evidence and the ancient economy. *Journal of Roman Studies, 65*, 164–171. http://dx.doi.org/10.2307/370070

Gadamer, H.-G. (1965). *Wahrheit und methode* [Truth and method]. Tübingen: Mohr.

Garnsey, P., Whittaker, C. R., & Hopkins, K. (1983). *Trade in the ancient economy.* Berkeley: University of California Press.

Gawlikowski, M. (1983). Palmyre et l'Euphrate [Palmyra and the Euphrates]. *Syria, 60*, 53–68. http://dx.doi.org/10.3406/syria.1983.6830

Gawlikowski, M. (1988). Le commerce de Palmyre sur terre et sur eau [The commerce of Palmyra on land and on sea]. In J.-F. Salles (Ed.), *L'Arabie et ses mers bordières* [Arabia and her bordering seas] (pp. 163–172). Lyon: GS-Maison de l'Orient.

Gills, B. K., & Frank, A. G. (1993). *The world system: Five hundred years or five thousand?* London: Routledge.

Goitein, S. D. (1974). *Letters of medieval Jewish traders.* Princeton, NJ: Princeton University Press.

Goitein, S. D., & Friedman, M. A. (2008). *India traders of the middle ages: Documents from the Cairo Geniza: India book.* Leiden: Brill.

Golitko, M., & Feinman, G. M. (2015). Procurement and distribution of pre-Hispanic Mesoamerican Obsidian 900 BC–AD 1520: A social network analysis. *Journal of Archaeological Method and Theory, 22*, 206–247. doi:10.1007/s10816-014-9211-1

Golitko, M., Meierhoff, J., Feinman, G. M., & Williams, P. R. (2012). Complexities of collapse: The evidence of Maya obsidian as revealed by social network graphical analysis. *Antiquity, 86*, 507–523. doi:10.1017/S0003598X00062906

Grant, C. P. (1937). *The Syrian desert.* London: A. & C. Black.

Hachicho, M. A. (1964). English travel books about the Arab near east in the eighteenth century. *Die Welt des Islams, 9*(1/4), 1–206. http://dx.doi.org/10.2307/1570430

Hodder, I. (1982). *The present past: An introduction to anthropology for archaeologists.* London: Batsford.

Horden, P., & Purcell, N. (2000). *The corrupting Sea: A study of Mediterranean history.* Oxford: Blackwell.

Horsburgh, J. (1841). *The India directory.* London: W.H. Allen.

Humphreys, S. C. (1969). History, economics and anthropology: The work of Karl Polanyi. *History and Theory, 8*, 165–212. http://dx.doi.org/10.2307/2504323

Hydrographer of the Navy. (1967). *Red Sea and Gulf of Aden Pilot* (11th ed.). London: Author.

Iggers, G. G. (1997). *Historiography in the twentieth century: From scientific objectivity to the postmodern challenge.* Middletown, CT: Wesleyan University Press.

Irwin-Williams, C. (1977). A network model for the analysis of prehistoric trade. In T. K. Earle & J. E. Ericson (Eds.), *Exchange systems in prehistory* (pp. 141–151). New York, NY: Academic Press.

Isaac, B. L. (2005). Karl Polanyi. In J. C. Carrier (Ed.), *A handbook of economic anthropology* (2nd ed., pp. 13–25). Cheltenham: Edward Elgar.

Jameson, M. (1983). Famine in the Greek world. In P. Garnsey & C. R. Whittaker (Eds.), *Trade and famine in classical antiquity* (pp. 6–16). Cambridge: Cambridge Philological Society.

Johnson, M. H. (2006). On the nature of theoretical archaeology and archaeological theory. *Archaeological Dialogues, 13*, 117–132. doi:10.1017/S138020380621208X

Kalentzidou, O. (2000). Discontinuing traditions: Using historically informed ethnoarchaeology in the study of evros ceramics. *Journal of Archaeological Method and Theory, 7*, 165–186. doi:10.2307/20177419

Knappett, C., Evans, T., & Rivers, R. (2008). Modelling maritime interaction in the Aegean Bronze Age. *Antiquity, 82*, 1009–1024. doi:10.1017/S0003598X0009774X

Kristiansen, K. (1999). Genes versus agents. A discussion of the widening theoretical gap in archaeology. *Archaeological Dialogues, 11*, 77–99. doi:10.1017/S1380203805211509

LaBianca, Ø. S., & Scham, S. A. (2006). *Connectivity in antiquity: Globalization as a long-term historical process*. London: Equinox Publishing.

Larsen, M. T. (2000). The old Assyrian city-state. In M. H. Hansen (Ed.), *A comparative study of thirty city-state cultures: An investigation conducted by the Copenhagen Polis centre* (pp. 77–87). Copenhagen: Det Kongelige Danske Videnskabernes Selskab.

Manning, J. G., & Morris, I. (2005). *The ancient economy: Evidence and models*. Stanford, CA: Stanford University Press.

Marcus, A. (1989). *The middle east on the eve of modernity: Aleppo in the eighteenth century*. New York, NY: Columbia University Press.

Mayerson, P. (1996). The port of clysma (Suez) in transition from Roman to Arab rule. *Journal of Near Eastern Studies, 55*, 119–126. http://dx.doi.org/10.1086/jnes.1996.55.issue-2

McLaughlin, R. (2010). *Rome and the distant east: Trade routes to the ancient lands of Arabia, India and China*. London: Continuum.

Meyer, J. C. (2000). Socialantropologi og komarativ metode. In J. W. Iddeng (Ed.), *Ad Fontes: Antikkvitenskap, kildebehandling og metode* (pp. 229–244). Oslo: Norsk Klassisk Forbund.

Millar, F. (1998). Caravan cities: The Roman Near East and long distance trade by land. In M. Austin, J. Harries, & C. Smith (Eds.), *Modus operandi: Essays in honor of Geoffrey Rickman* (pp. 119–137). London: Institute of Classical Studies, School of Advanced Study, University of London.

Morris, I., & Manning, J. G. (2005). *The ancient economy: Evidence and models*. Stanford, CA: Stanford University Press.

Murphey, R. (1990). Turkey romanticized: Images of the Turks in early 19th-century English travel literature. *Journal of the American Oriental Society, 110*, 291–303. http://dx.doi.org/10.2307/604532

Naval Intelligence Division. (1944). *Iraq and the Persian Gulf*. London: Author.

Naval Intelligence Division. (1946). *Western Arabia and the Red Sea*. London: Author.

North, D. C. (1977). Markets and other allocation systems in history: The challenge of Karl Polanyi. *Journal of European Economic History, 6*, 703–716.

North, D. C. (1990). *Institutions, institutional change and economic performance*. Cambridge: Cambridge University Press. http://dx.doi.org/10.1017/CBO9780511808678

Onorati, J. (2007). Debating economic anthropology within a primitive context. *Emory Endeavors in World History, 1*. Retrieved from http://history.emory.edu/home/documents/endeavors/volume1/Joeys.pdf

Ooghe, B. (2007). The rediscovery of Babylonia: European travellers and the development of knowledge on lower Mesopotamia, sixteenth to early nineteenth century. *Journal of the Royal Asiatic Society, 17*, 231–252. doi:10.1017/S1356186307007237

Parlasca, K. (1969). A new grave relief from Syria. *Brooklyn Museum Annual, 11*, 169–185.

Parlasca, K. (1992). Auswärtige Beziehungen Palmyras im Lichte archäologischer Funde [Foreign connections of Palmyra in light of archaeological finds]. *Damaszener Mitteilungen, 6*, 257–265.

Polanyi, K. (1963). Ports of trade in early societies. *The Journal of Economic History, 23*, 30–45. http://dx.doi.org/10.1017/S002205070010333X

Polanyi, K., Arensberg, C. M., & Pearson, H. W. (Eds.). (1957). *Trade and markets in early empires*. New York, NY: Free Press.

Potts, D. (1988). Trans-Arabian routes of the pre-Islamic period. In J.-F. Salles (Ed.), *L'Arabie et ses mers bordieres* [Arabia and her bordering seas] (pp. 127–161). Lyon: GS-Maison de l'Orient.

Renfrew, C. (1977). Alternative models for exchange and spatial distribution. In T. K. Earle & J. E. Ericson (Eds.), *Exchange systems in prehistory* (pp. 71–90). New York, NY: Academic Press.

Retsö, J. (1991). The domestication of the camel and the establishment of the frankincense road from South Arabia. *Orientalia Suecana, 40*, 187–219.

Rivers, R., Knappett, C., & Evans, T. (2013). What makes a site important? Centrality, gateways and gravity. In C. Knappett (Ed.), *Network analysis in archaeology* (pp. 125–150). Oxford: Oxford University Press. http://dx.doi.org/10.1093/acprof:oso/9780199697090.001.0001

Roller, D. W. (2004). *The world of Juba II and Kleopatra Selene: Royal scholarship on Rome's African frontier*. New York, NY: Routledge.

Rosen, S. A., & Saidel, B. A. (2010). The camel and the tent: An exploration of technological change among early pastoralists. *Journal of Near Eastern Studies, 69*, 63–77. http://dx.doi.org/10.1086/644524

Roux, V. (2007). Ethnoarchaeology: A non historical science of reference necessary for interpreting the past. *Journal of Archaeological Method and Theory, 14*, 153–178. http://dx.doi.org/10.1007/s10816-007-9030-8

Sartre-Fauriat, A., & Sartre, M. (2008). *Palmyre: la cité des caravanes* [Palmyra: The city of caravans]. Paris: Gallimard.

Scheidel, W. (2010). *Rome and China: Comparative perspectives on ancient world empires*. Oxford: Oxford University Press.

Scheidel, W., & Reden, S. v. (2002). *The ancient economy*. New York, NY: Routledge.

Schoff, W. H. (1989). *Isidorus, characenus. Parthian stations: An account of the overland trade route between the Levant and India in the first century B.C.* Chicago, IL: Ares.

Seland, E. H. (2008). The Indian ships at Moscha and the Indo-Arabian trading circuit. *Proceedings of the Seminar for Arabian Studies, 38*, 283–288.

Seland, E. H. (2011). The Persian Gulf or the Red Sea? Two axes in ancient Indian Ocean trade, where to go and why. *World Archaeology, 43*, 398–409. doi:10.1080/00438243.2011.605844

Seland, E. H. (2012). Death or taxes: Choosing itineraries between the Persian Gulf and the Mediterranean in the mid-18th century. *Academic Quarter, 4*, 97–108.

Seland, E. H. (2014). The organisation of the Palmyrene caravan trade. *Ancient West and East, 13*, 197–211. doi:10.2143/AWE.13.0.3038738

Sidebotham, S. E., Hense, M., & Nouwens, H. M. (2008). *The Red Land: The illustrated archaeology of Egypt's eastern desert*. Cairo: The American University in Cairo Press.

Silver, M. (2011). Transaction/administrative costs in Greco-Roman antiquity with special reference to the

implications of Atheism/naturalism in classical Athens. *Marburger Beiträge zur Antiken Handels-, Wirtschafts- und Sozialgeschichte, 29*, 49–93.

Sindbæk, S. M. (2007). The small world of the Vikings: Networks in early medieval communication and exchange. *Norwegian Archaeological Review, 40*, 59–74. doi:10.1080/00293650701327619

Sindbæk, S. M. (2009). Open access, nodal points, and central places: Maritime communication and locational principles for coastal sites in south Scandinavia, c. AD 400–1200. *Eesti Arheoloogia Ajakiri, 13*, 96–109.

Sirks, A. J. B. (1991). *Food for Rome: The legal structure of the transportation and processing of supplies for the imperial distributions in Rome and Constantinople*. Amsterdam: J.C. Gieben.

Steensgaard, N. (1974). *The Asian trade revolution of the seventeenth century: the East India companies: And the decline of the caravan trade*. Chicago, IL: University of Chicago Press.

Teixidor, J. (1984). Un port romain du désert, Palmyre et son commerce d'Auguste à Caracalla [A Roman port in the desert]. *Semitica, 34*, 1–127.

Thornton, J., Seller, J., Skelton, R. A., Verner, C., & Fischer, W. (1970). *The English pilot: The third book*. Amsterdam: Theatrum Orbis Terrarum.

Tibbetts, G. R. (1961). Arab navigation in the Red Sea. *The Geographical Journal, 127*, 322–334. http://dx.doi.org/10.2307/1794953

Tomber, R. (2012). From the Roman Red Sea to beyond the empire: Egyptian ports and their trading partners. *British Museum Studies in Ancient Egypt and Sudan, 18*, 201–215.

Verhagen, P., & Whitley, T. G. (2012). Integrating archaeological theory and predictive modeling: A live report from the scene. *Journal of Archaeological Method and Theory, 19*, 49–100. http://dx.doi.org/10.1007/s10816-011-9102-7

Veyne, P. (1971). *Comment on ecrit l'histoire* [On the writing of history]. Paris: Du Seuil.

White, H. (1973). *Metahistory: The historical imagination in nineteenth-century Europe*. Baltimore, MD: Johns Hopkins University Press.

Whitehouse, D. (2001). Begram: The glass. *Topoi: Orient-Occident, 11*, 437–449.

Whitewright, J. (2007a). How fast is fast? Technology, trade and speed under sail in the Roman Red Sea. In J. Starkey, P. Starkey, & T. Wilkinson (Eds.), *Natural resources and cultural connections of the Red Sea* (pp. 77–87). Oxford: Archaeopress.

Whitewright, J. (2007b). Roman rigging material from the Red Sea port of Myos Hormos. *International Journal of Nautical Archaeology, 36*, 282–292. doi:10.1111/j.1095-9270.2007.00150.x

Will, E. (1957). Marchands et chefs de caravanes à Palmyre [Merchants and caravan leaders of Palmyra]. *Syria, 34*, 262–277. http://dx.doi.org/10.3406/syria.1957.5237

Will, E. (1992). *Les palmyréniens: La Venise des sables* [The Palmyrenes: The Venice of teh Sands]. Paris: Armand Colin.

Yoffee, N., & Sherratt, A. (1993). *Archaeological theory*. Cambridge: Cambridge University Press. http://dx.doi.org/10.1017/CBO9780511720277

Yon, J.-B. (1998). Remarques sur une famille caravanière à Palmyre [Remarks regarding a family of caravan merchants in Palmyra]. *Syria, 75*, 153–160. http://dx.doi.org/10.3406/syria.1998.7547

Young, G. K. (2001). *Rome's Eastern trade: International commerce and imperial policy, 31 BC–AD 305*. London: Routledge.

Żuchowska, M. (2005). Palmyre – cité caravanière? [Palmyra – City of caravans?]. In P. Bieliński & F. M. Stępniowski (Eds.), *Aux pays d'Allat* [From the lands of Allat] (pp. 325–343). Warzawa: Instytut Archeologii.