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Abstract

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Despite their seemingly mundane nature, maps—defined as presentations of human experiences of space (Tomá ková , 2018: 81)—are contentious, often disputed documents that affect daily life in tangible ways. In the United States, for instance, the redrawing of electoral maps, sometimes referred to as gerrymandering, can change the outcomes of political elections. In Eastern Europe, mapping companies' decisions to show Crimea as belonging to Russia or Ukraine have heightened political tensions between the two countries (Dixon and Stern, 2019). And, along the India–Bangladesh border, the modification of enclave boundary lines has increased various groups' access to schools, electricity, and health care (Taylor, 2015). As these and other examples show, how we draw maps matters.

Mapping is and has been an integral part of archaeological fieldwork since the discipline's inception (Gillings et al., 2018: 1), and archaeological mapping techniques have changed dramatically over the last century and a half. In the Maya area, to take one example, the earliest explorers used compasses and tape measures to create plan maps of site centers (e.g. Maler, 1911; Maudslay, 1889; Stephens, 1841). In the mid-20th century, researchers used plane tables, alidades, and transits to create plan and topographic maps of entire sites. And, late 20th century archaeologists used total stations, Global Positioning Systems (GPS), and Geographic Information Systems (GIS) to map both sites and inter-site areas (Wolf, 1997). More recently, remote sensing methods, and particularly airborne light detection and ranging (LiDAR), have revolutionized how archaeologists visualize and interpret the landscape (e.g. Canuto et al., 2018; Chase et al., 2011, 2012; Garrison et al., 2019; Inomata et al., 2018). LiDAR, in comparatively little time, allows scholars to conduct full coverage surveys of entire regions and to identify features, such as causeways and agricultural terraces, difficult to document with traditional methods.

As mapping technologies have changed, so have theoretical perspectives on what maps are and what maps do. Scholars in various disciplines have recognized that maps and other spatial images, much like photographs, are neither neutral nor objective, but selective and subjective. As discussed below, maps and other spatial visualizations do not represent space: they create it. John Millhauser and Christopher Morehart (2016: 248), among others, have considered this "tension between the goal of collecting data to produce objective representations of space and the fact that such representations are subjective abstractions." As they rightly caution, "technological means of observation may improve, but spatial data are still the products of human judgments, imperfections, and histories" (Millhauser and Morehart, 2016: 248). Thus, even hi-tech LiDAR images are subjective understandings of the world.

The more advanced the technology used, the greater the risk that scholars will view maps and other spatial images as natural reflections of the world rather than as social constructs that legitimize certain spatial ontologies and "literally and

figuratively influence the way we see the world" (Offen and Dym, 2011: 6; see also Gillespie, 2011; Millhauser and Morehart, 2016). Consequently, some (e.g. Tomá ková , 2018: 81) have suggested that archaeologists shift their focus from greater accuracy of, to greater variation in, spatial representations. Examples of alternative and experimental mapping projects include post-representational cartography (e.g. Azócar Fernández and Buchroithner, 2014; Kitchin et al., 2009), feminist mapping (e.g. Pavlovskaya and Martin, 2007; Tomá ková , 2018), and participatory or communal mapping (e.g. Herlihy and Knapp, 2003; Parker, 2006). Few archaeologists, however, have advocated for the production of Indigenous-style maps alongside traditional archaeological ones. What if archaeologists created both conventional site maps and visual cartographic histories? What might such images look like? What additional insights could be gleaned from representing the same space in different ways? And, what might be the broader political implications?

This article considers the theoretical, epistemological, and ontological issues associated with the creation of maps generally before examining conventional archaeological site maps and Indigenous visual cartographic histories. It then introduces the contemporary community and archaeological site of Punta Laguna, located in the eastern interior of the Yucatan peninsula, and presents two previously unpublished maps of the same space: one based on traditional archaeological conventions and the other on Indigenous Maya spatial ontologies. Indigenous Maya maps often include historical and experiential information omitted in conventional site maps. And, because they adopt a relational rather than an abstract understanding of space, Maya maps are arguably more congruous with contemporary social theories about space than are traditional Western ones. Further, the juxtaposition of two different maps of the same space suggests that Western spatial ontologies are neither natural nor ubiquitous and that there is no one correct or most accurate map of an archaeological site. Finally, the creation and use of Indigenous-style maps offers one way to question hegemonic Western understandings of the world and to affirm the value and utility of non-Western perspectives.

Making maps

Isaac Newton was among the first to outline an absolute notion of space, positing that space exists prior to, and independently of, human action. In the centuries that followed, many continued to conceptualize space geometrically, as an empty, preexisting area in which events occur. Since the 1980s, however, scholars have reexamined the importance of space and reconsidered the "spatiality of human life" (see also Guzmán et al., 2016; Soja, 1996: 2). Henri Lefebvre (1991), David Harvey (1989, 1996), and Edward Soja (1996), for example, have argued that space is social, rather than geometric, and relational, rather than an object. For these and other scholars, space produces and is produced by social relationships, and should be understood as it mediates those relationships. As Lefebvre (1991: 26) succinctly wrote, "(social) space is a (social) product." But how is space produced? Lefebvre (1991: 38–46) and Adam Smith (2003: 73–75) have proposed a tripartite

framework. Spatial practice or "experience" considers the physical movement of people and objects through space. Depictions of space or "perception" involves aesthetics, the senses, and the emotional interactions between people and places. And, representational space or "imagination" includes discussions about, and images of, space, such as theoretical arguments, photographs, and paintings. Humans thus produce space by moving through it, emotionally interacting with it, and envisioning it.

Different conceptualizations of space have resulted in different understandings of what maps are and what mapmaking does. An absolute notion of space suggests that maps are attempts to represent "as faithfully as possible the spatial arrangements of phenomena on the surface of the earth … the world as it really is" (Kitchin et al., 2009: 4). According to this view, maps are "truth documents" and mapmaking primarily involves "theorizing how best to represent and communicate that truth" (Kitchin et al., 2009: 4–5). A relational understanding of space, however, suggests a different perspective. Scholars conceptualizing space relationally—as producing and being produced by social relationships—have maintained that maps are not objective, neutral truth documents, but subjective, political instruments of power (e.g. Harley, 1992; Pickles, 2004; Wood, 2010). They have further argued that mapmaking, rather than simply revealing existing features, is a form of spatial imagination and thus a potent means of producing space.

Part of the spatial turn in the social sciences thus involved "attempt[s] to deconstruct Western mapping and lay bare its assumptions" (Gillings et al., 2018: 2). At least three critiques are common. First, because mapmakers must inevitably decide which information to include in a map and which to omit, maps are necessarily selective and reflect the biases of their creators (Aliphat and Caso Barrera, 2013; Valdez-Tullett, 2018; Wood, 2010). Further, maps are inherently political documents because they legitimize certain spatial ontologies and naturalize specific ways of viewing and knowing the world, such as through a bird's eye perspective or a Cartesian grid (Mundy, 1996; Valdez-Tullett, 2018; Wainwright and Bryan, 2009). Finally, maps are highly codified—and thus often inaccessible—records made using conventions known only to specialists or members of a particular group (Lee, 2018). For these and other reasons, the production and persistence of most maps are the "direct result of historical processes in which some voices and visions are fostered and celebrated while others are … erased, silenced, and destroyed" (Millhauser and Morehart, 2016: 248). It is thus not surprising that various researchers have understood maps not as simplistic representations of the world, but as instruments of authority, weapons of imperialism, and tools of the powerful (Barteet, 2013; Craib, 2004; Harley, 1992; Huhndorf, 2009; Offen and Dym, 2011).

In response to such critiques, archaeologists, geographers, and other scholars have produced several forms of alternative and experimental maps. Of particular note are participatory or communal maps—maps "produced collaboratively by residents of a particular locale, often featuring local knowledge and resources" (Parker, 2006: 270). Researchers create these maps with and for local—often

though not always Indigenous—groups, and frequently for expressly political purposes. Perhaps most commonly, these maps are devised and used to support land tenure claims and revitalize cultural heritage (Bryan and Wood, 2015; Chapin et al., 2005; Herlihy and Knapp, 2003; Huhndorf, 2009). As one group of participatory mappers explained:

> whereas those in power have employed maps over the centuries to mark off and control territories inhabited by Indigenous peoples, Indigenous peoples are now putting together their own maps and wielding them to defend their ancestral lands from encroachment by those in power. (Chapin et al., 2005: 620)

The most prominent example in the Maya area is the Maya Atlas (1997), created by Maya peoples in the Toledo district of Belize. This atlas, developed to aid in legal land rights cases, includes not only maps but also village histories, local folklore, and descriptions of daily life.

The notion that maps can empower both dominant and marginalized groups is theoretically sound. Indeed, individuals who question inequality and resist authority often do so by appropriating the same mechanisms regimes use to foster their legitimacy. Put differently, political authority is "inherently problematic, as it is contingent on multiple factors that can be used against central authority as well as being used by it" (Earle, 1997: 10). David Kertzer (1988), for instance, has shown that particular symbols and the rituals that employ them serve to bolster and also to challenge authority. Such "symbolism is necessary to prop up the governing political order, but it is also essential in overthrowing it" (Kertzer, 1988: 174). Similarly, Michel Foucault has suggested that spectacles of terror afford opportunities for a regime to demonstrate its authority but may also induce a community to reject that authority. A group "drawn to the spectacle intended to terrorize it, could express its rejection of the punitive power and sometimes revolt" (Foucault, 1979: 59).

Nevertheless, many of these participatory and communal maps have been problematic (Wainwright and Bryan, 2009; Wood, 2010). Perhaps most notably, these maps continue to rely on Western spatial ontologies to make Indigenous peoples legible (sensu Scott, 1998) to nation states. In other words, the "possibilities that mapping Indigenous lands might reveal the fiction of state claims to sovereignty over a given territory is blunted by the explicit goal of formulating claims that can be recognized by the state" (Wainwright and Bryan, 2009: 164). Participatory and communal maps thus arguably reify conventional Western ways of producing space and naturalize Western ways of seeing and knowing the world. Beyond the political implications of affirming only one group's spatial worldview, most Western maps are also "incommensurable with any pre-modern or prehistoric experience of the world that archaeologists . . . [may be] trying to reach" (Tomá ková , 2018: 85). Michel de Certeau (1984: 91–110) has emphasized the
importance of such experiences to the production of space. He differentiates between the conceptual city as seen distantly from above and the bodily experience

of walking through that city, and argues that scholars need to consider corporeal, pedestrian perspectives in addition to more removed, overhead ones (Buchanan, 1996: 117–119; de Certeau, 1984: 91–110).

How then can maps and mapmaking be used to empower marginalized groups? What options exist beyond participatory and communal mapping? This article encourages archaeologists to experiment with, and to produce a multiplicity of, maps and other spatial images, including those based on non-Western spatial ontologies. On the one hand, "knowledge, as a social product, [is] a matter of dialogue between different versions of the world" (Mitchell, 1986: 38; see also Rundstrom, 1991: 6). On the other hand, as Pierre Bourdieu (1977) has argued, that which we take for granted can only be exposed as arbitrary when contrasted with opposing visions of the world. A consideration of traditional archaeological site maps and visual cartographic histories of Maya communities is illustrative.

Malerized maps and visual cartographic histories

Since the late 19th century, archaeologists have created Malerized maps of ancient Maya communities (see Hutson, 2012 for an overview of 19th-century mapping techniques in the Maya area). Malerization refers colloquially to a specific visual convention used to represent structures. It is one way of rendering intelligible complex architectural features in a two-dimensional form. Malerized maps employ a bird's eye view and a Cartesian coordinate system. Most distinctly, they represent architectural structures, such as mounds and platforms, as nested polygons connected at their corners (Figure 1(a)). The outer polygon corresponds to the outer edge of the feature and the distance between the polygons denotes the feature's height (Andrews, 1969; Hutson and Magnoni, 2017). The greater the distance between the inner and outer polygons, the higher the feature. Notably, although this convention is named after Teobert Maler, Alfred Maudsley was its original creator (Hutson, 2012; Wolf, 1997: 9–10).

The use of a standardized mapping convention throughout the Maya area has proven essential for comparative spatial studies (e.g. Kurnick, 2019b), and Malerization specifically has been a useful means to document the distribution of, and relationships among, architectural features. Nevertheless, like all mapping conventions, Malerization is imperfect. As Scott Hutson and Aline Magnoni (2017; Hutson, 2012) have noted, the creation of Malerized maps requires several interpretive leaps. Perhaps most prominently, these maps aim to represent structures as they would have appeared in the past, rather than as they do appear in the present (Figure 1(b)). The "goal is not to represent, in simplified form, the shape of the disorderly stone piles as they appear today … [but] to extrapolate from these piles the clean, polygonal shapes that the buildings had before they crumbled" (Hutson and Magnoni, 2017: 38). The map's creator must thus infer what features would have looked like hundreds or even thousands of years ago.

Further, like all spatial images, Malerized maps include only limited types of data—the location and height of structures—and exclude other information

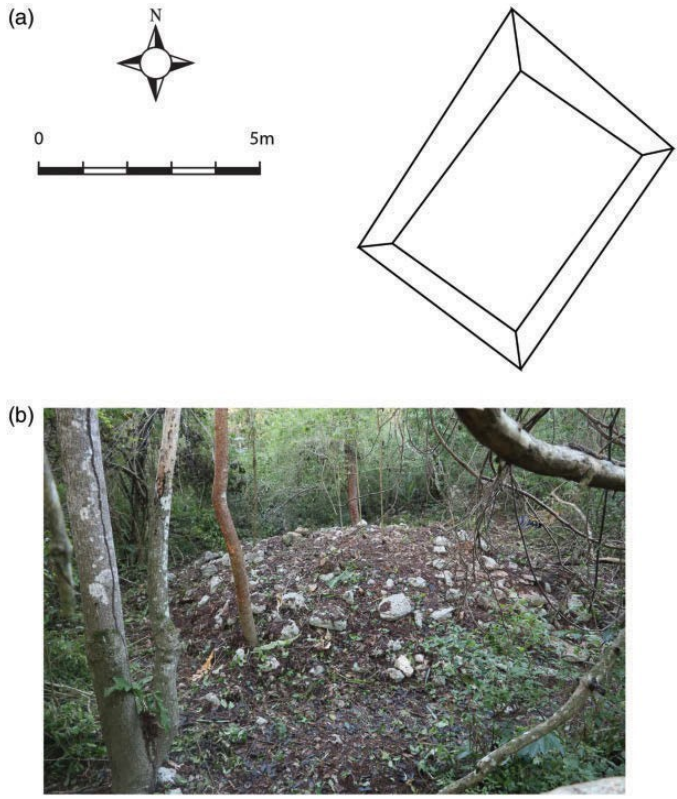

Figure 1. (a) A Malerized representation and (b) a photograph of the mound "Manzana" at Punta Laguna. The outer polygon of the drawing corresponds to the base of the mound and the distance between the polygons corresponds to the mound's height.
Source: Drawing by David Rogoff and photograph by Sarah Kurnick.

(Hutson, 2012). They do not, for instance, communicate when features were built, the materials with which they were constructed, or the presence of decorative elements, such as facades or murals. As Susan Gillespie (2011: 5) has written, the "temporality of the use and modification of landscape features as well as their material, sensual, and aesthetic qualities are usually silenced." It is also notable that the Maler convention is not completely standardized. In some instances, the inner polygon—rather than the outer polygon—represents the outer edge of the feature. Complicating this problem, many archaeologists omit specific descriptions of how they create Malerized site maps. In other words, "different archaeologists follow different procedures for transforming what they see on the ground into prisms" and "published commentary on procedures for drawing prisms is rare" (Hutson and Magnoni 2017: 38, and Hutson 2012).

Maps created by Indigenous peoples differ dramatically from Malerized and other archaeological site maps. Indigenous cartographic traditions, including Hawaiian performative cartographies, Navajo verbal maps, and the Nuwuvi Salk Song Trail, are diverse (Pearce and Louis, 2008: 110). They can be tangible or intangible, include or exclude supernatural places, and function as navigation aids or as community records (Kelley and Francis, 2005; Pearce and Louis, 2008). Indigenous Mesoamerican maps—known primarily, though not entirely, from the Mixtec region (see Smith, 1973) and from Central Mexico (see Mundy, 1996, 1998a, 1998b, 2008)—are themselves variable, yet have several common characteristics. At least three aspects of Indigenous Mesoamerican spatial ontologies are worthy of note.

First, Mesoamerican maps combine space and time to record not just geography but also history, including creation stories, ancestral migrations, and dynastic changes, among other events (Barteet, 2013, 2015; Mundy, 1998a; Solari, 2009, 2010). This fusion of space and time is perhaps not surprising given that many Mesoamerican peoples understood "space as so deeply connected to time, be it historical or calendrical, that the two could not be rent apart" (Mundy, 1998b: 193). Second, Indigenous Mesoamerican maps depict specific, imperfect spatial features as generalized and idealized symbolic elements: a process Barbara Mundy (1998a: 15) refers to as "modelling." In colonial-period maps of the Aztec capital of Tenochtitlan, for example, drawing the island capital in the exact center of a perfectly circular lake, "although far from planimetrically correct, reflects an indigenous understanding of the centre of empire" (Mundy, 1998a: 14). Such maps, unlike conventional archaeological site maps, are thus generally unconcerned with the specific location or height of architectural features, and "perfect geometry, albeit distorted planimetry" is common (Mundy, 1998a: 14).

Third, Indigenous Mesoamerican maps are based on social rather than geometric projections, and ancient Mesoamerican "spatial reality was one defined and structured by social relationships" (Mundy, 1996: xvi). Such maps communicate interactions between various groups and depict human and supernatural beings as integral, constitutive parts of the landscape. Further, important places are often marked by place names rather than by realistic representations of geographical features, by hieroglyphs rather than pictographs. As Mundy (1998b: 198) notes, this "distinction between image and hieroglyph is subtle but important: it means that Mesoamerican maps show us spaces that are made visible through names, rather than through contour lines or apparent features." In other words, these maps display humanized, rather than independently existing, places. Indigenous Mesoamerican maps thus adopt a relational, rather than an abstract, understanding of space.

Comparatively little information exists about specifically Maya maps. The earliest known Maya map was painted at the end of the 4th century on the wall of a royal residence at the site of La Sufricaya in the Petėn region of Guatemala (Estrada-Belli and Hurst, 2011). Dubbed Mural 6 N, this painting depicts two distinct structures, a road with footprints, and several figures, likely both human

Figure 2. Reproduction of a 4th-century mural painted on the wall of a royal residence at La Sufricaya in the Peten region of Guatemala. This image is the earliest known Maya map. Source: Drawing by Heather Hurst. Courtesy of the Holmul Archaeological Project.

and supernatural (Figure 2). The upper structure is built in a Teotihuacan style with talud-tablero architecture, and the lower structure is built in a Maya style with a thatched roof (Estrada-Belli and Hurst, 2011: 26). The road implies that these two buildings are located in spatially distinct places and the footprints suggest that the image is recording a journey between these two locations, possibly with "rituals performed or a supernatural experience en route" (Estrada-Belli and Hurst, 2011: 27). No surviving place names or other writing accompany the image, though it formed part of a larger mural complex celebrating the one-year anniversary of the arrival of prominent political figure Sihyaj K'ahk' from Teotihuacan to the nearby Maya metropolis of Tikal (see also Estrada-Belli and Hurst, 2011: 27; Estrada-Belli et al., 2009).

Several aspects of this map are notable. Its creators, for instance, identified places not by their specific locations or exact distances from one another—there is neither a grid nor a scale—but by the sensual, aesthetic characteristics that would have influenced, and been influenced by, those walking past: the colors, materials, and forms that combined to produce specific architectural styles. Further, the map includes depictions of several human and supernatural individuals. Both structures and the road are occupied by various figures, and no aspect of the built environment is shown divorced from a human or supernatural presence. Buildings, roads, and other features derive their importance, and do not exist independently, from the human and supernatural relationships they mediate. The map thus communicates social relationships, and specifically connections between Maya and Teotihuacan peoples (Estrada-Belli et al., 2009: 26).

Almost all surviving Maya maps, however, were produced during the colonial period and syncretize Maya and Spanish cartographic traditions. This syncretism is evident in numerous images, including but not limited to those in the Relaciones Geográficas: a well-known collection of texts and maps created by Indigenous and Spanish individuals in response to a 16th-century questionnaire distributed throughout the Viceroyalty of New Spain (see Mundy, 1996). Colonial-period Maya maps have several defining characteristics. They often take a circular form, are oriented with east at the top of the page, include multiple viewing perspectives, and use footprints to represent movement (Barteet, 2013, 2015; Solari, 2009, 2010).

The Mani Land Treaty Map, created by Gaspar Antonio Chi in 1557, offers one example (Figure 3). It is circular with east oriented at the top of the page. The capital of Mani is placed at the center of the image, suggesting its importance. Within the circle, roads are represented by singular, solid lines and towns by unique church toponyms. The pre-colonial center of Uxmal is the only place depicted with a symbol that does not resemble a church. Outside the circle are a series of small, identical rectangular signs with crosses. Some (Solari, 2009: 48) have suggested that these signs represent undifferentiated, peripheral communities existing beyond the Mani territory, "foreign towns … relegated to [the] edges." Others (Barteet, 2015: 184) have suggested that these signs instead represent boundary stones, like those still used in some contemporary Maya communities.

Figure 3. The Mani Land Treaty Map, created by Gaspar Antonio Chi in 1557.
Source: Courtesy of The Latin American Library, Tulane University.

Over time, these syncretic colonial-period maps were gradually replaced by Western-style maps using grids, scales, and coordinate systems. Colonizers thus conquered physical territory and subjugated spatial imaginations, eventually replacing Indigenous spatial ontologies with their own. It has been argued that

"one measure of successful European colonization in the Americas . . . was the displacement of native cartographic traditions" (Offen and Dym, 2011: 9). What if archaeologists revived these cartographic traditions and produced Indigenous-style maps alongside more traditional archaeological ones? What might such images look like? What additional insights could be gleaned by representing the same space in different ways? And, what might be the broader political implications? This article offers preliminary answers to these and other questions by juxtaposing a Malerized site map and an Indigenous Maya cartographic history of the same place: Punta Laguna, Yucatan, Mexico.

Punta Laguna

The contemporary community and archaeological site of Punta Laguna is located in the eastern interior of the Yucatan peninsula of Mexico, approximately 20 km northeast of Cobá (Figure 4). The contemporary village consists of approximately 150 residents who speak Yucatec Mayan as their primary language. Like other villages in the area, Punta Laguna includes a bilingual grade school, a small church, a concrete soccer field, house compounds, and milpa fields. Most notably, the village also includes an ecotourist attraction: the Otoch Ma'ax Yetel Kooh (House of the Monkey and Puma), also known as the Punta Laguna Nature

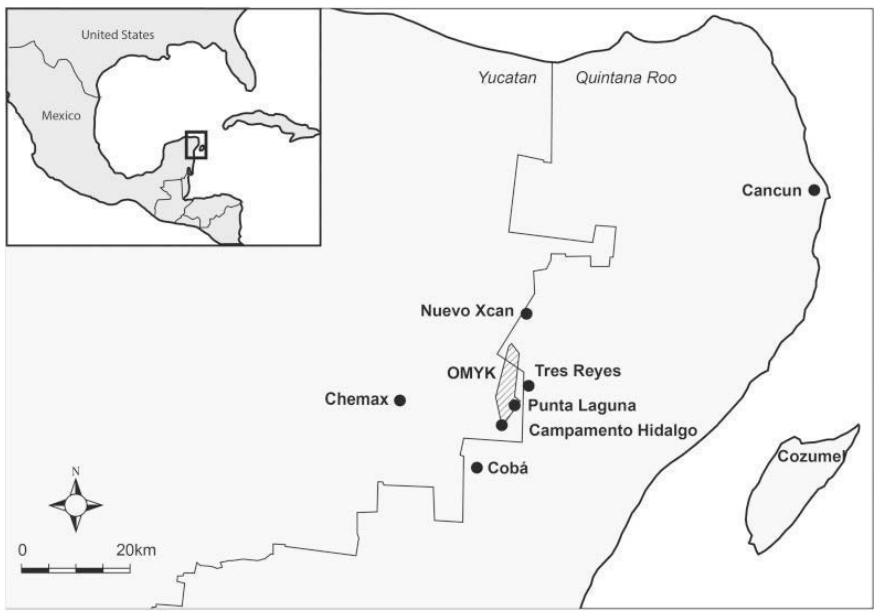

Figure 4. A conventional, Western map showing the location of Punta Laguna and other locales in the Yucatan Peninsula of Mexico.
Source: Map by Sarah Kurnick.

Reserve. Punta Laguna is a rare example of an ecotourist attraction created by, and that tangibly benefits, Indigenous peoples (Kurnick, 2019a).

In 1964, Maya chicleros (gum tappers) from the town of Chemax founded Punta Laguna in an area of biologically diverse old growth forest surrounding a lagoon. This environment sustained trees from which to extract chicle. Coincidentally, it also supported a substantial population of wild spider monkeys and contained an archaeological site. Punta Laguna remained relatively isolated until 1982, when a newly built road connected the village to nearby Cobá and Nuevo Xcan. After tourists began visiting Punta Laguna to see the spider monkeys, community members began offering, and charging for, tours of the area. Soon thereafter, they began advocating for the protection of the spider monkeys, their habitat, and the archaeological site. With assistance from primatologists and non-governmental organizations (Andrews, 2006), community members petitioned the government to designate the land as a federally protected flora and fauna area. In 2002, Mexico's National Commission on Natural Protected Areas (Comisión Nacional de Areas Naturales Protegidas, or CONANP) acquiesced and officially established the reserve, transforming 5367 ha of land into a nature preserve. The residents of Punta Laguna subsequently founded a cooperative to manage a communal eco-tourism venture including, but not limited to, viewing the wild spider monkeys (Aguilar Cordero et al., 2012; Bonilla Moheno and García-Frapolli, 2012; García-Frapolli et al., 2007, 2008, 2013; Kurnick, 2019a).

The archaeological site of Punta Laguna, located almost entirely within the nature reserve, includes a cenote containing an ancient mortuary deposit of at least 120 individuals (Martos López, 2008; Rojas Sandoval, 2007, 2008, 2010; Rojas Sandoval et al., 2008); several stelae; a series of caves; and over 200 mounds. These mounds range in height from just above ground level to approximately 6 m and include seven miniature masonry shrines—one-room buildings that span only a few meters in length, width, and height (Benavides Castillo and Zapata Peraza, 1991; Brasdefer, 1988; Kurnick, 2019b; Kurnick and Rogoff, 2014, 2016). Ceramics (see Robles Castellanos, 1990) suggest that Punta Laguna was occupied continuously, with ebbs and flows, from the Middle Preclassic (600–300 BCE) through the Postclassic period (1100–1550 CE) (Ancona Aragon et al., 2019).

Today, tourists visiting Punta Laguna can walk with a local Maya guide on trails through the jungle to search for spider monkeys and archaeological structures; rappel into the cenote (no damage is done to the skeletal remains resting deep below the tourists on the cenote floor); canoe and ride a zip line across the lagoon; and buy crafts from local artisans. Tourists can also participate in a Maya purification ceremony, led by a village shaman and conducted entirely in Yucatec Mayan. This ceremony takes place around a traditional altar and includes burning copal incense and drinking non-alcoholic balché from a gourd. Because the community does not keep records, it is unknown how many visitors they have had or how much money they have made since the establishment of the reserve.

A Malerized site map of Punta Laguna

Over three consecutive field seasons, members of the Punta Laguna Archaeology Project, including the coauthors and Punta Laguna community members, conducted a systematic, non-invasive site survey. During preliminary fieldwork in 2014, we walked through part of the Punta Laguna Nature Reserve and noted the location of forty mounds, all located between 200 and 500 m from the lagoon. Subsequently, we used Google Earth Pro to create a donut-shaped survey grid, comprising 100 m by 100 m squares, covering all land between 200 and 500 m from the lagoon; we thought the lagoon the likely focal point of the site, and expected settlement to spread around the lagoon rather than away from it.

During the 2015 and 2016 field seasons, we used a Garmin GPS to walk in lines through the survey grid. Because of the dense vegetation and the presence of protected plants, these lines were necessarily imperfect but were located between 20 and 50 m apart. We drew, photographed, and described each architectural feature we encountered and took a series of points using a Trimble GeoXH GPS with Pathfinder Office software. The codirectors then used the survey data to create a Malerized site map. With GIS software, we georeferenced the Malerized drawing of each mound with its GPS points to create a shapefile, the most common format for storing geospatial data. Specifically, we performed a Helmert transformation: a distortion-free transformation ideal for locating scaled drawings without altering their shape. Once we located the Malerized drawings in space, we created a new shapefile layer in which we digitally redrew each mound, tracing over the transformed hand-drawn images.

The Malerized site map (Figure 5) shows the location, height, and extent of the approximately 200 mounds that have been documented at Punta Laguna. Like other Malerized maps, it represents mounds as idealized, nested polygons; adopts a bird's eye view; and aims to represent the archaeological site as accurately as possible. It depicts the geographic extent of the site, the number, density, and alignment of mounds, and how the mounds relate spatially to one another. The map shows that settlement extends around almost the entirety of the lagoon, with the biggest gap in the northwest. Based on their small size and low elevation, most structures, and particularly those to the north and south of the lagoon, were likely house mounds. The largest mounds are in the east, forming the site's center. Notably, the larger architectural features appear to be clustered in groups while the likely house mounds are more dispersed. As with all Malerized maps, this image excludes obvious indicators of the mounds' temporalities, states of preservation, or building materials.

A visual cartographic history of Punta Laguna

In 2017, the coauthors printed, laminated, and distributed copies of the Malerized site map to Punta Laguna residents. Much to our chagrin, individuals who had lived their entire lives in the community, and who make their livings giving guided

Figure S. The Malerized site map of Punta Laguna.
Source: Map by David Rogoff and Sarah Kurnick.

tours of the reserve, did not recognize the Malerized map as a spatial representation of Punta Laguna. This moment was profound and revealing. The coauthors had incorrectly assumed Western worldviews to be normal, natural, and ubiquitous, and had failed to acknowledge or incorporate Indigenous Maya spatial ontologies into the Punta Laguna site map. To help correct this mistake, the codirectors created an additional site map, and specifically a visual cartographic history that represents space in a similar manner as do ancient and colonial Maya maps—that, in other words, combines space and time to record geography and history; models specific, imperfect geographical features as generalized and idealized symbolic elements; and depicts space relationally.

Relying on the existing corpus of Maya maps, the codirectors chose to depict those locations and events that have been the most important products and producers of social relationships at Punta Laguna. Archaeological excavations and ceramic analyses allowed us accurately to depict the most significant ancient people and places. Informal conversations with community members and a detailed study of the information provided in the locally managed community museum allowed us accurately to depict the most significant historical and contemporary people and places.

Like other Maya maps, the visual cartographic history of Punta Laguna (Figure 6) is circular in form with east at the top of the page: the cardinal directions are in Yucatec Mayan. It adopts multiple viewpoints and relies on neither a grid nor a scale. Important locations are represented by unique toponyms, roads by solid black lines, and narrative events involving movement—including migration and intensive social interactions—by paths with footprints. Both human and supernatural figures are present, and the various aspects of the built environment derive their importance from the human and supernatural relationships they mediate.

Punta Laguna lies at the center of the image, suggesting its importance. The lagoon is represented by a generalized oval shape merged with the Maya glyph for water, and the community by a circular array of symbols of its ancient, historic, and recent history: a miniature masonry shrine, a sapodilla tree being tapped for gum, and the logo of the Najil Tucha cooperative that currently manages the ecotourism business. A series of important, nearby places, each depicted by a unique toponym, forms a larger concentric circle around Punta Laguna. The ancient Maya metropolis of Cobá is represented by its most iconic structure, the Nohoch Mul pyramid. The historic village of Yodzonot is represented by its most typical architectural form, a pole and thatch house. And, the communities of Chemax, Tres Reyes, and Campamento Hidalgo are represented by the specific churches present in each town. Each structure is shown as it would look if one approached it on foot, and not from a bird's eye view.

This map depicts two narrative events. In the lower right, a path with footprints and individuals in ancient Maya garb moving toward each other records the intensive social interactions between ancient inhabitants of Punta Laguna and Cobá—interactions suggested archaeologically by similarities in the two communities'

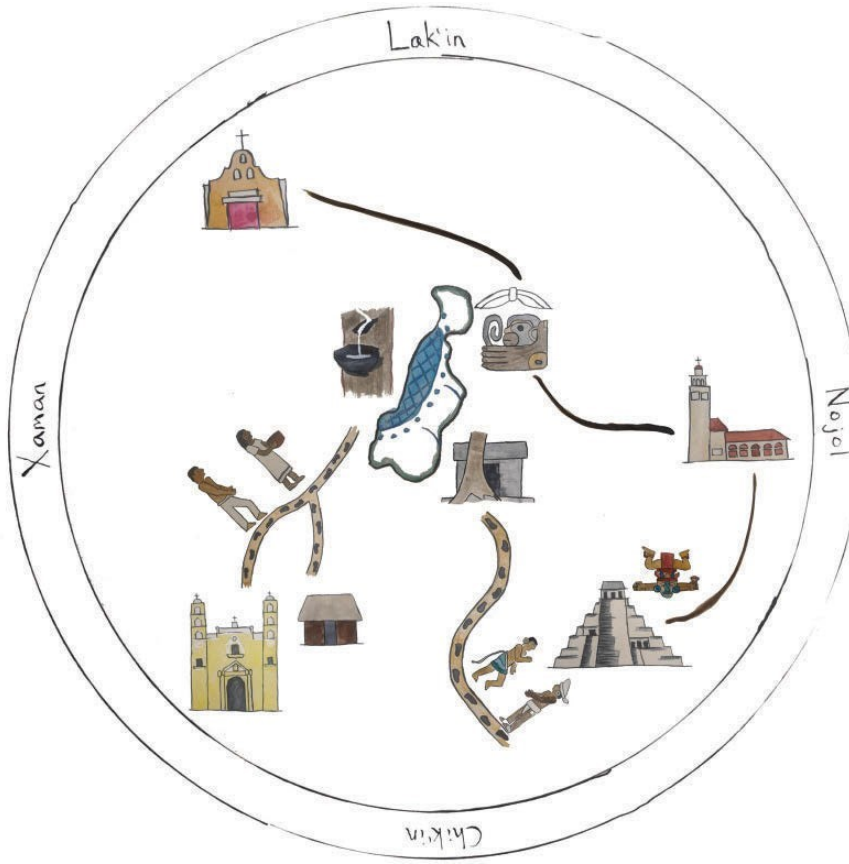

Figure 6. A visual cartographic history of Punta Laguna.
Source: Map by David Rogoff and Sarah Kurnick.

occupation histories, ceramics, and architecture. A representation of the Diving or Descending God (see Taube, 1992: 41–44)—an image of which adorns the small shrine at the top of Nohoch Mul—emphasizes that such social relationships involved supernatural entities as well as human beings. In the lower left, a path with footprints and individuals in Caste War-era garb moving in the same direction records the historic migration of families from Chemax to found Yodzonot and Punta Laguna. Also shown on the map is the road, represented as a solid black line, that currently connects Tres Reyes, Punta Laguna, Campamento Hidalgo, and Cobá .

Notably, this map elicited a different response from members of the Punta Laguna community than did the Malerized site map. Community members described the visual cartographic history in positive terms and immediately

recognized the churches, temples, and other structures as symbols of specific, nearby places.

Discussion

Why create a visual cartographic history of Punta Laguna and why juxtapose it with a Malerized site map? What insights can be gleaned? What are the broader political implications? And, how can the creation of a multiplicity of maps improve archaeological practice?

Perhaps most obviously, Indigenous Maya maps record different information than do conventional Western maps, and thus provide additional insights into the past. Maya maps include the historical events that produced and were produced by particular spaces, as well as images of what features would have looked like when approached on foot. These historical and experiential aspects of space are generally absent in Malerized and other traditional archaeological site maps.

Further, because Maya maps adopt a relational rather than abstract understanding of space, they are arguably more congruous with contemporary social theories about space than are traditional Western maps. Maya maps do not depict space as an empty area existing prior to and independently of human action. Rather, they depict space as the product and producer of social relationships. Their subject matter focuses on the events that shape, and are shaped by, human and supernatural interactions, including migrations, religious journeys, and economic and cultural exchanges. And, they portray human and supernatural figures as critical parts of the landscape. Temples, roads, and other features of the built environment derive their importance from, and do not exist independently of, the human and supernatural relationships they mediate.

Regardless of the specific spatial ontologies used, however, it is beneficial to create and juxtapose multiple maps of the same space. Such juxtapositions remind us that Western spatial ontologies are neither natural nor ubiquitous, and that there is no one definitive or most accurate map of an archaeological site (see Ren, 2006). In other words, "there is not just one universal form of knowledge (Western science), but a variety of knowledges" (Turnbull, 2000: 1). Further, such juxtapositions make clear the mapping conventions that scholars often take for granted—such as orienting north at the top of the page or relying on a bird's eye perspective—and highlight the various ways in which maps are selective and subjective. Pierre Bourdieu (1977: 166) uses the term doxa to describe "that which is taken for granted" and argues that doxa can only be exposed as arbitrary when contrasted with an opposing understanding of the world. In his words, the "truth of doxa is only ever fully revealed when negatively constituted by … the confrontation of competing discourses" (Bourdieu, 1977: 168). The concurrent presentation of two maps relying on different spatial ontologies offers one way to demonstrate that particular cultural worldviews are arbitrary rather than natural. It offers one way to turn doxa into orthodoxy and to question the seemingly unquestionable.

The publication of Indigenous spatial ontologies alongside Western ones also carries broader political implications. If maps are social constructs that legitimize specific ways of seeing the world, then the use of non-Western maps can give voice to and legitimize non-Western worldviews (see Carry Jr, 2011; Hoobler, 2006). Sonya Atalay (2006: 300), among others, has argued that one goal of archaeological practice should be "researching alternative ways of viewing the past, history, and heritage and working to see that these are viewed as valuable and legitimate ways of seeing." Additionally, scholars can challenge broader hegemonic understandings of the world by revealing the doxic nature of mapping more generally. By converting doxa into orthodoxy, or that which is taken for granted into one option among many, scholars can question contemporary social orders and political practices. Indeed, across space and throughout time, the "dominated classes have [had] an interest in pushing back the limits of doxa and exposing the arbitrariness of the taken for granted" (Bourdieu, 1977: 169).

Conclusion

David Turnbull (2000) has made two separate yet interrelated observations about maps. He argues that the "strongest theme running through the history of cartography is that of maps becoming increasingly scientific and ever more accurate mirrors of nature" (Turnbull, 2000: 97). And, he suggests that many people are "largely unconscious of the centrality of maps in contemporary Western life precisely because they are so ubiquitous, so profoundly constitutive of our thinking" (Turnbull, 2000: 95). These observations are interrelated. The more accurate maps appear, the more they will be taken for granted rather than critically evaluated.

This article has considered the theoretical, epistemological, and ontological issues associated with the creation of maps and examined Malerized site maps and Indigenous visual cartographic histories. It has encouraged archaeologists to produce not only more accurate maps, but also a greater variety of maps and, as one example, has presented two previously unpublished maps of the same space: Punta Laguna, Yucatan, Mexico. One map is based on traditional archaeological conventions and the other on Indigenous Maya spatial ontologies.

Further, this article has argued that the production and juxtaposition of a multiplicity of maps is beneficial to archaeological practice. Beyond providing additional information about the past, such juxtapositions make clear the cartographic conventions that scholars often take for granted and highlight the ways in which maps are selective and subjective. They remind us that Western spatial ontologies are neither natural nor ubiquitous, and that there is no one correct or most accurate map of an archaeological site. Further, the use of non-Western perspectives gives voice to and legitimizes non-Western spatial ontologies and allows scholars to question contemporary social orders and challenge taken-for-granted political practices. As noted at the outset of this article, be it related to contemporary politics or the ancient past, how we map matters.

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Sarah Kurnick received her doctorate in anthropology from the University of Pennsylvania and now serves as an assistant professor of anthropology at the University of Colorado Boulder. Her research focuses on the creation, perpetuation, and negation of institutionalized social inequality, and her primary interests include the role of the past in shaping the political present and how archaeology can foster positive social change. Since 2014, she has codirected a Maya community archaeology project at Punta Laguna, Yucatan, Mexico.

David Rogoff will receive his doctorate in anthropology from the University of Pennsylvania in 2020. He specializes in Mesoamerica and particularly the Maya. His research focuses on economic anthropology, research methods, and community engagement. Since 2014, he has codirected a Maya community archaeology project at Punta Laguna, Yucatan, Mexico.