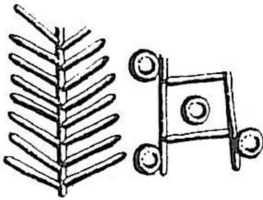


CHAPTER ONE

Water and Power in Past Societies

An Introduction



Emily Holt

Water is occupying an increasingly large part of our contemporary environmental consciousness. Over the past decade, a slow trickle of popular scholarship, such as the epilogue to Tom Standage's *A History of the World in Six Glasses* (2006), has become a flood of volumes analyzing water's role in the past, present, and future. Brian Fagan's *Elixir* (2011), Charles Fishman's *The Big Thirst* (2012), James Salzman's *Drinking Water: A History* (2013), and David Sedlak's *Water 4.0* (2014) are just a few examples of this trend. The global public is becoming more aware of water as a contested resource, recognizing that access to water and its distribution and control are sources of empowerment or disenfranchisement, wealth or poverty, health or illness throughout the world. As users of interconnected water systems, we are also confronting the reality that water is likely to become increasingly contested in the future, as global climate change is "fundamentally water access change" (Scarborough and Lucero 2011).

Growing popular interest contributes to bringing water research to the foreground in archaeology as well as in other fields. However, the archaeology of water has a long history that predates the popular discussion by several decades. Beginning with the so-called hydraulic hypothesis put forward by Karl Wittfogel in the 1950s (Wittfogel 1957), archaeologists have long been interested in the social and political consequences of controlling water. While the original hydraulic hypothesis has been criticized, rejected, reconsidered, and reformulated many times over, the essential role water plays in all societies has kept water a constant in archaeological studies of human power structures.

Discussions of the archaeology of water often open with the truism that water is a human necessity, which is one way of tackling the immensity of water as a subject of inquiry and putting it into a universal framework. Focusing on the biological imperative for humans, animals, and plants to take in water encourages archaeologists to think about the power implications of water in places where it is scarce, spatially discontinuous, or

seasonally absent. Many early studies of the archaeology of water focused on areas that fit these geographical descriptions, making irrigation networks a persistent subject of interest for archaeologists.

However, focusing solely on the consumption of water can eclipse the fact that water is an equally powerful resource in areas that do not experience water insecurity as it is generally formulated. Water can have potent political and symbolic meanings without being scarce. Water that is not directly consumed—such as ocean and seawater, coastal marshes, and brackish lagoons—can facilitate travel and transportation, provide additional resources, and form a component of cosmologies. While these types of water have figured prominently in archaeological studies, they have generally been considered under different theoretical frameworks than studies of fresh water. It is only more recently that these types of water have also been considered under “the archaeology of water,” perhaps due to our growing awareness of climate change and the interconnectedness of all earth’s water.

The goal of this volume is to provide a broad sample of case studies addressing different types of water and different ways that water is incorporated into human power structures. The goal of this introduction is therefore to orient the reader with respect to the diverse theoretical perspectives that have been taken to discuss water in past societies as well as to introduce the following chapters. Because useful water theory has been developed not only in archaeology but also in related fields such as cultural anthropology, human geography, and history, I draw on case studies from a variety of disciplines to illustrate recurring themes in our understandings of water.

WATER: A TOTAL SOCIAL FACT

Water’s very fundamentality can make it overwhelming as a category of inquiry. The fact that water is omnipresent in human society, yet present in different amounts and varying forms, seems to both invite and defy attempts to theorize it. For the past century, scholars throughout the social sciences as well as governmental and nongovernmental organizations have looked for ways to conceptualize the pervasiveness of water in human experience, often with the long-term goal of improving water management and mitigating water-related crises. Because the theory applied in archaeological studies has developed in connection with these influential trends, often specifically referencing them and contributing to them, I will begin this introduction with a general overview of the development of water theory before focusing specifically on water in archaeological thought.

Cultural anthropologists Ben Orlove and Steven Caton have recently applied Mauss’s concept of a “total social fact” to the study of water (2010). By “total social fact,” Mauss meant “social phenomena that cut across virtually all domains of society” (2010:402). Orlove and Caton observe that “Water connects domains of life such that the water used in one will affect the water used in others.” Similarly, Veronica Strang paraphrases Lévi-Strauss in observing that water is good “for thinking with,” citing the fact that water “permeates all organic things and kinds, including humankind, flowing through and connecting the various micro and macro scales at which they interact” (2015:133).

While these observations may seem intuitively obvious, they emerge from a line of critical analysis of human relationships with water that has been developing primarily since the late twentieth century. For most of the preceding century, the dominant paradigm in the study and management of water has been the hydrologic cycle. The original concept of the hydrologic cycle (Horton 1931) served to define hydrology as a field of study with a particular body of experts. The hydrologic cycle was presented as apolitical and specifically natural, occurring independently of human behavior.

Beginning around the early 1970s, the broad theoretical framework of political ecology began to challenge the assumption that ecological models such as the hydrologic cycle were either apolitical or independent of human behavior. I will not try to summarize the development of political ecology here since there are already many useful summaries (e.g., Robbins 2004). It is important to note, however, that many approaches to water in human society began to apply a political ecology perspective, and this approach has continued to be influential in water studies. Managerial approaches to water used by governmental and nongovernmental organizations promote and respond to particular perceptions of water that often privilege industry, well-funded lobbies, and specific social groups (Fernandez 2014).

The questioning of the natural world as apolitical and independent of human behavior that began with political ecology continued during the late twentieth century. As the inherent separation of nature and society was increasingly questioned by cultural theorists such as Lefebvre (1991) and Latour (1993), scholars of water history began deconstructing the sociopolitical relationships that created specific water uses. Swyngedouw's (1999) influential study of water management in late-nineteenth and early-twentieth-century Spain was explicitly critical of the hydrologic cycle as a sufficient framework for understanding water history. Drawing on Latour and the political ecology framework, Swyngedouw showed that Spain's status as a water-poor nation was part of socioeconomic and political discourses promoted by influential thinkers in the arts and government.

Roughly around the same time, the term *hydrosocial cycle* began appearing in works of human geography as an alternative to the hydrologic cycle (Bakker 2002). Critical geographers Linton and Budds (2014) have recently sought to advance the hydrosocial cycle as a useful conceptual framework, defining the term as "a socio-natural process by which water and society make and remake each other over space and time." Conceptualizing water as part of the hydrosocial cycle encourages researchers to follow water as it moves in society, rather than focusing on a single point of access. The importance of this approach has been demonstrated by numerous studies in cultural anthropology, which have found that different types of water may not be interchangeable within particular cultural frameworks because the specific trajectories of water affect its physical and social properties. For example, the treated water supplied by a mining company may not be an acceptable substitute for the flowing water the company diverts for its productive processes (Li 2013). Similarly, the recycling of wastewater for irrigation can have long-term consequences different from the consequences that using fresh water would have (Barnes 2014).

The interconnectedness of all water through the hydrosocial cycle is perhaps exemplified by the connection between current climate change and a variety of water-related

challenges to the resilience of human systems. In the field of human geography, Kirsten Hastrup (2009) has proposed the term *waterworlds* to describe the pervasive interconnections of water in human life. Posing this term in the context of responding to climate change–related disasters, Hastrup divides contemporary waterworlds into the melting ice, the rising seas, and the drying lands. Her conceptualization is particularly useful because it highlights the connectedness among different kinds of water and water-related disasters rather than treating the world’s different kinds of water as separate.

A final important influence in water scholarship that is highlighted by Hastrup’s waterworlds is the human security perspective. The United Nations established the Human Security Unit in 2004 with the goal of protecting essential human freedoms by protecting people from critical and pervasive threats (UNHSU 2009:5). The human security approach emphasizes the interconnectedness of seven different types of security: economic, food, health, environmental, personal, community, and political. Some social scientists have begun adopting a human security perspective in their work, and the value of this perspective in the integrated world of water is clear. While access to sufficient water may appear most related to environmental security, it also has effects in food production, health, and economic enterprises. Problems in any of these securities may lead to threats to personal and community security, and perhaps even political security. Cultural anthropologists Wutich and Brewis (2014) apply a human security perspective to a cross-cultural study of water use, finding that necessary amounts of water vary, but having enough water as it is culturally defined is essential for well-being.

ORGANIZING WATER, ORGANIZING PEOPLE

As a total social fact, water relates constantly to human power struggles and has been a consideration in archaeological studies of sociopolitical structures from the beginning of the discipline. I will not attempt to provide a complete history of the study of water in archaeology here, since such syntheses have been undertaken before (e.g., Billman 2002) and the list of scholars who have contributed important insights to the archaeological scholarship on water is too long to cite in its entirety. Instead, I present several broad theoretical categories into which archaeological understandings of water often fall, including ethnographic and historical studies where they have been influential. Also, it is important to acknowledge at the outset that all approaches to water are inherently linked. We cannot separate biology from culture or the human systems we create from our daily lived experiences and the environments in which they occur.

WATER MANAGEMENT AND PRODUCTION

The idea that irrigation leads to social and political complexity can be traced in Western thought to Karl Marx (Avinieri 1969:7). It is then found in the work of V. Gordon Childe (1950) and Julian Steward (1949, 1955). This “hydraulic hypothesis” was most fully developed by Karl Wittfogel in his work *Oriental Despotism: A Comparative Study of total Power* (1957). One of the earliest explicit considerations of the role of water in

creating inequalities in the past, the hydraulic hypothesis presents water as an essential resource requiring top-down management to successfully meet the needs of populations. In this model, everyone needs access to water, but the nature of information gathering and actualization means that only a few people can be controlling the water, which results in the formation of power hierarchies.

The hydraulic hypothesis has been heavily critiqued on both ethnographic and archaeological grounds (Adams 1960; Billman 2002; Butzer 1976; Lanning 1967; Leach 1959; Mitchell 1973). Many subsequent studies have shown that the need for equitable water management often promotes and maintains social equality, or at least diffused corporate heterarchies, in areas where states are unable to assert their dominance (Coward 1979; Hunt and Hunt 1976; Ostrom 1992; Trawick 2001). The work of Braemer et al. (2009) in Syria, Thomas Glick (1970) in medieval Valencia, and Helena Kirchner (2009) in the Balearics provide a sample of specifically archaeological examples. However, the hydraulic hypothesis has also been found to continue to have explanatory power, especially when considered broadly in conjunction with other social processes that may be taking place in societies reliant on irrigation (Davies 2009; Sidky 1997).

The managerial requirement of irrigation networks may not be sufficient to cause the development of social hierarchies; however, the economic and political advantages of controlling water—and products that rely on water—may promote hierarchy formation (Haas 1982; Moseley 1974, 1975; Stanish 1994). In semiarid areas, access to water, the land improved by irrigation, or the fruits of newly irrigated lands can be bestowed as gifts on loyal or particularly meritorious followers (Sidky 1997:1008–1009).

The hydraulic hypothesis focused on water as a resource in agricultural production, but water is also essential for some kinds of industrial production. Differential water access can result in differential levels of economic success, as has been observed for mining communities in ancient Greece (Van Liefferinge et al. 2014).

WATER, IDEOLOGY, AND DISPLAY

The tendency to view water primarily from an economic, engineering, and managerial perspective does not do justice to the many ways humans interact with water (Swynedouw 2004). Ideological and symbolic interactions with water can also be important sources of sociopolitical power. One influential line of research in the ideological control of water was initiated by Clifford Geertz (1972, 1980), who proposed that irrigation in modern Bali is organized at the local level, defined by the *subak*, through the rituals of the rice cult. This hypothesis was critiqued by Hobart (1982), whose study of one *subak* showed a serious mismatch between the activities of agriculture and the rituals of the rice cult. Further studies by J. Stephen Lansing (Lansing 1987, 1991; Lansing and Kremer 1993) indicated that *subaks* participate in a supra-local organization system controlled not by the state government, but by the religious organizations of the Balinese water temples. Alternative explanations of Balinese water management have been offered (Hauser-Schäublin 2003, 2011; Lansing et al. 2005), but the ideological relationships between water and power structures remain central to the system.

The strategy of maintaining sociopolitical power by controlling water-related ritual has been noted ethnographically in other cultures as well (e.g., Håkansson 1998), and numerous archaeological examples have been discussed, with the symbolic aspects of Maya water management being a particular focus (Isendahl 2011; Luzzadder-Beach et al. 2016; Scarborough 1998). Water is also used symbolically to display political dominance through monumental constructions (Harrower 2009), curry public favor with gifts of water (Longfellow 2011), and build elite identity through conspicuous consumption (Novák 2002; Jones and Robinson 2005).

WATER AND CONNECTIVITY

One of water's powers that was particularly important in the preindustrial world is the way in which it facilitates transportation and the exchange of goods, ideas, and people. The connectivity offered by water of varying types and the differential effects of this connectivity on the people who harnessed it is a major current in archaeological, historical, and ethnographic studies.

The effects of water connectivity have long been a focus of study in Mediterranean archaeology and history. It is often observed that the connectivity offered by the Mediterranean Sea was a dominant force in the development of the ancient Greek world (Pomeroy et al. 1999). Detailed analyses of sea-based connectivity as creating a distinctly Mediterranean way of life have been developed by Braudel (1972), Horden and Purcell (2000), and Broodbank (2013). More localized studies have examined the Cyclades (Broodbank 2002) and the Nile Delta (Wilson 2012), and the differential benefits of sea travel as opposed to land travel in the Roman Mediterranean can be explored in Stanford's ORBIS Project (Scheidel and Meeks, <http://orbis.stanford.edu/>).

The social and economic outcomes of water connectivity have also been a pronounced focus in archaeological and ethnographic scholarship on the island cultures of Polynesia and Melanesia. Malinowski's seminal study of the Kula ring (1932) and the many subsequent studies that have challenged and elaborated his original work (Dalton 1977; Damon 2002; Weiner 1976) may be the most obvious examples. Other studies highlighting this connectivity include those of the trade relationships of the Vitiaz Strait (Harding 1967, Lilley 1988), the Port Moresby area of Papua New Guinea (Allen 1984), the Arawe Islands (Gosden and Pavlides 1994), and the chiefdoms of the Philippines (Junker 1999).

EXPERIENCING WATER

Another broad approach to water is a relational materiality or phenomenological approach, found in the work of anthropologists such as Veronica Strang (2008, 2015) and Matt Edgeworth (2011) as well as some human geographers (Walker et al. 2011). This approach advocates a departure from an anthropocentric understanding of human-environmental relationships to one in which other material agents—such as water—take active roles in mutually constituting landscapes and humans' lived experiences of them. Substances

such as water are considered to have agency, or if not agency, a stubborn materiality that pushes back against humans' attempts to completely control them. The materiality of water can be pleasant or onerous, biddable or ungovernable, helpful or harmful. The practices of living with the substance of water result in emergent phenomena that defy the nature/culture divide.

One trend in phenomenological approaches to water focuses on water as an element of the human creation of landscapes and places (Harmanşah 2014). In this approach, the symbolic power of water as it appears in springs, caves, rivers, and other natural features is accessed and harnessed, as in the evocative example of the sacred Maya landscape of freshwater pools in Cara Blanca, Belize, analyzed by Lisa Lucero and Andrew Kinkella (2014). Naturally occurring waterscapes are sometimes echoed or recreated by human efforts, as they were in the case of the Maya through the building of temples, and as has been argued by Colin Richards (1996) for water-filled ditches surrounding the henges of Neolithic Britain. Such sacred or symbolic landscapes are often interpreted and reinterpreted over time, creating layers of self-referential meaning.

CLIMATE AND HUMAN ECOLOGY

Water is undeniably a critical factor in climate change, and many archaeologists have approached human interactions with water in the past through the interpretive lens of changing climate. Scholars have identified the lack of water resulting from adverse climate change as being linked to the collapse of complex societies in cultures as diverse in time and place as the southern Levant in the Late Bronze Age (Langgut et al. 2013) and the Maya in the Terminal Classic Period (Haug et al. 2003). While narratives that are too deterministic and fail to account for human adaptability have been criticized in rebuttals such as *Questioning Collapse* (McAnany and Yoffee 2010), our contemporary experiences leave little doubt that climate change can be a major factor affecting human behavior.

One current approach that highlights an ecological perspective is human niche construction. Human niche construction looks at how humans modify their environments to make them more favorable, resulting in new ecological niches. Water management of all kinds, particularly irrigation systems, can usefully be considered using the model of human niche construction because water management systems not only create long-term change in the resources available to humans (Wilkinson et al. 2015; Zhu et al. 2015), they also result in different ecosystems that present new health conditions and challenges for the humans who create them (Kloos and David 2002).

WATER AND POWER IN PAST SOCIETIES

The diverse collection of papers presented here results from the conference Water and Power in Past Societies, the 8th Visiting Scholar Conference of the Institute for European and Mediterranean Archaeology, held at the University at Buffalo on April 11–12, 2015. These papers were chosen to present a wide range of theoretical and methodological approaches, as well as to provide geographical and chronological breadth. In addition to providing

specific case studies that will be of interest to scholars in each geographical region, these papers demonstrate detailed applications of the theoretical perspectives discussed above.

The first part of this volume—Productive Power and the Ecological History of Waterscapes—includes case studies that highlight the relationships between water and different kinds of production, with particular focus on how production is situated in trajectories of political economy. Examples of agricultural, pastoral, and industrial production are located within specific waterscapes that simultaneously offer possibilities and create limitations for producers. Within each waterscape, repeated human actions interact with local geography to build histories of production with important consequences for understanding productive relationships at any given point along the trajectory. Such histories of water-based production are present in most current waterscapes, and archaeological inquiry can provide the background for understanding how these waterscapes should be viewed.

Christopher T. Morehart opens Part I with a chapter contrasting two raised-field or *chinampa* farming systems in the southern and northern regions of the Basin of Mexico. He traces their histories of integration with local and state-level institutions, providing a critique of exclusively bottom-up models of water management with important implications for assessing the sustainability of traditional agricultural systems.

Eva Kaptijn traces social organization in the *longue durée* as it relates to irrigation in the Zerqa Triangle, Jordan. Her chapter highlights the effects of geography and sunk costs on the long-term persistence of the Zerqa Triangle irrigation system while tracing the changing social organizations that have managed the system in response to different political realities.

In a chapter that complements the two agricultural studies, Emily Hammer argues that mobile pastoralism is the “other half of the story” of sustainable adaptation to dry environments. While irrigation in dry environments may bring water to the crops that need them, mobility takes an alternative approach by bringing animals to water. Additionally, small-scale water management projects such as check dams and cisterns serve to permanently improve the landscape for mobile pastoralists while requiring only minimal upkeep.

Finally, Kim Van Liefferinge provides an important counterpoint to the studies focusing on food production by examining the role of water in industrial production in the mining industry of classical period Laurion, Greece. Van Liefferinge finds that the differential potential to gather water offered by specific locations for ore-processing workshops had long-term effects on the workshops’ success.

The second part of this volume—Waterscapes, Power Plays, and Display—includes case studies of water used to legitimize power symbolically. These studies draw on theories of elite identity, viewership, and phenomenology to understand how people experience water displays and their role in maintaining power structures. While two of the studies address water and display in dry areas, Part II opens with a study of water symbolism in a geographical region that is not semiarid and that does not experience water scarcity by current definitions, emphasizing that water can be a powerful symbolic resource in any environment.

Brenda Longfellow provides a detailed assessment of how elite male identity in the early Roman Republic was tied to the control of nature. Control of nature was often expressed through controlling water in the pools and fountains that were essential parts of elite homes. As water control became established as a familiar, private expression of elite male power, some individuals began using the same symbolic elements to transfer expressions of power into public spaces, contesting and legitimizing their positions in Roman Republican society and government.

Leigh-Ann Bedal provides a contrasting study of the breakdown of an elite-supported water system. During the Hellenistic and Roman periods, the Nabateans of the desert city of Petra engineered a complex hydraulic system to supply both practical needs and impressive water displays. As Petra's economy declined in Late Antiquity, the extensive hydraulic system fell into disuse, replaced by localized systems supporting much smaller populations.

Michael J. Harrower compares the role of water in ancient Southwest and Southeast Arabia (Yemen and Oman), showing how the timing and intensity of water availability can lead to different ways of monumentalizing water management. Water in Oman was primarily available through continuously flowing springs, leading to social organizations of water sharing that were expressed in communal tombs. Conversely, water in Yemen was available in the form of destructive flash floods that encouraged more hierarchical forms of labor organization, expressed in water diversion architecture.

The third part of this volume—Coastal Water—presents case studies that analyze water as a transportation resource. Drawing on observations about the utility of water for encouraging long-distance travel and decreasing transportation costs, these studies present ways in which knowledge of and access to sea routes differentially shaped the success of ancient communities.

Christopher Prescott, Anette Sand-Eriksen, and Knut Ivar Austvoll examine the control of coastal waterways as a source of power in Late Neolithic and Early Bronze Age Norway. They find that the ability to control navigational bottlenecks through the threat of force probably contributed to the formation of small-scale chiefdoms in these specific, strategic locales.

Similarly, Jennifer L. Gaynor's chapter shows how the frequently overlooked fortresses of the nonurban maritime hub of Tiworo, in central Indonesia, were key strategic points in attempts by Western colonial powers to control the trade in nutmeg and cloves. Power relationships in the archipelago were spatially discontinuous and essentially personal, defying attempts to understand them through land-based models.

Justin Leidwanger provides a complementary perspective by examining small-scale maritime trade in Roman-period Cyprus. Leidwanger uses a GIS approach to analyze the significance of low-level connectivity offered by small ships and minimally developed ports, finding that even these modest opportunities had a significant effect on the development of rural economies.

The final part of this volume—Water Archaeology: Pasts, Presents, Futures—presents four case studies that exemplify how archaeology can inform our understanding of water management in the *longue durée*, including insights for present and future water

management. Archaeology's time-depth as a social science offers unique perspectives and information that no other field can provide (e.g., Ljungqvist et al. 2015).

Matt Edgeworth begins Part IV with an analysis of rivers in England and Wales showing how a millennium of human-river entanglement has resulted in a contemporary waterscape providing thousands of opportunities for small-scale hydropower development. Through their mutual agency, rivers and the communities that live near them interact to create hybrid entities shaped by—and offering possibilities for—both human and natural systems.

Ömür Harmanşah provides an analysis of the political ecology of water in Central Anatolia, focusing on how running field projects entangles archaeologists in contemporary water politics. Salvage projects in particular, conducted before major planned construction projects, often involve contested water rights between local communities and supralocal governmental interests. Archaeologists may choose to engage with these water politics or not, but they cannot escape being part of the “geology of belonging” of these particular water systems.

Sturt Manning's contribution addresses the fact that assessments of potential water-related crisis inevitably involve reconstructing local and regional hydrologies, which can vary over long spans of time. Manning combines detailed evidence for precipitation drawn from tree ring-based reconstructions to address the frequency of crisis-inducing drought in Anatolia and the Levant in the past millennium. Manning finds that, while local and short-term food shortage was probably common, longer-term and widespread famine were very rare, though potentially historically pivotal.

Vernon L. Scarborough's chapter closes the volume with a comparative study that addresses one of the biggest theoretical questions currently facing water archaeologists: Does our research have something to say about water management in the present and future? Examining the southern lowland Maya on the Yucatan Peninsula and the ancestral Puebloan populations occupying Chaco Canyon of the U.S. Southwest, Scarborough identifies important similarities in water and environmental management and their relationship to social instability.

CONCLUSIONS

Water as a subject of study resembles water as a physical substance: it simultaneously creates, crosses, and defies boundaries. Water's many manifestations and the ways people interact with them refuse to be easily generalized. Finding a single common denominator for understanding water is a challenge, and one that many scholars would argue against. While I would agree that there is no “right approach” to water, some common themes have emerged during the production of this volume that deserve to be highlighted.

The first is the necessity of a *longue durée* perspective in the study of water. Whether the theoretical focus of a study emphasizes the ecological or the social, water cannot be separated from its local socionatural histories.

A second important theme is the labor demands of water. All water is managed in some way, and the demands of this management call for organizational solutions. This

leaves open the possibility of choosing either more egalitarian or more hierarchical social structures. At the same time, the demands of water are juxtaposed with the potentials of water. Water can make life easier, for example, by providing a means of faster, cheaper transportation. Like water's demands, water's potentials also present opportunities to create hierarchies, and they reward those who can master the technologies that unlock them.

A final important theme is water's inherent symbolic power. Regardless of the nature of their environments, humans cannot distance themselves from water. Whether in wet surroundings or dry, water is a daily experience in some form or another, creating inescapable, lived meanings that can be harnessed to justify and express hierarchy—or to resist it.

Because of its daily essentiality, water offers constantly repeated opportunities for interpretation, management, and control. In the context of these quotidian experiences of water, different ways of gathering and applying knowledge, different definitions of what is desirable and valuable, different goals for agro-pastoral and industrial production, and different understandings of how to value natural resources come into conflict. In the past as in the present, these conflicts are often resolved in favor of those who possess greater social, political, and economic capital.

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