

The West and the Rest

The Science of the Great Divergence

Peter Turchin

University of Connecticut

There is now a huge literature attempting to explain the ‘Great Divergence’ between Europe and the rest of the world during the early modern period. *The Uniqueness of Western Civilization* by Ricardo Duchesne follows a distinct route in both framing the question and proposing an answer to it. I see two serious problems with Duchesne’s work. The first one is how he resolves the intrinsic tension between his ideological goals and the requirements of the scientific method. The second problematic aspect, which is shared by most of the broader literature on this topic, is that there are serious methodological difficulties in explaining unique historical events. This article discusses general approaches to the study of unique events, such as the Great Divergence. It also critiques two myths of European exceptionalism that are discussed by Duchesne and, even more importantly, still have broad currency in the historical literature: the supposed geographic uniqueness of Europe and the so-called Western Way of War.

Introduction: Science versus Ideology

The Uniqueness of Western Civilization by Ricardo Duchesne (2011) is an interesting and thought-provoking, but also problematic book. It falls within the huge literature on the ‘Rise of the West,’ but follows a distinct route in both framing the question and proposing an answer to it. The main thrust of the book, as well as Duchesne’s response to Martin Hewson (2012), is one that stresses “uniqueness,” “exceptionality,” and “the unparalleled cultural creativity” of the West.¹ Going by the neutral definition, every human culture, of course, is unique as all have features not shared by other cultures. However, Duchesne does not use the qualifier ‘unique’ in a neutral sense, and of course not to mean ‘uniquely bad.’ The main thrust of *The Uniqueness of Western Civilization* is to argue against “the devaluation of Western culture that swept the academic world starting around the 1960s,” and the article in the current

¹ As best as I could determine Duchesne does not clearly define the boundaries of ‘the West.’ While Ancient Greece is most certainly in, it is unclear whether the present-day Balkans (Poland? Russia?) are considered by him to be part of the Western Civilization.

Corresponding author’s e-mail: peter.turchin@uconn.edu

Citation: Turchin, Peter. 2013. The West and the Rest: the Science of the Great Divergence. *Clodynamics* 4: 67–85.

issue of *Clodynamics* similarly celebrates the achievements of the supposed progenitors of the West, the Indo-Europeans.

Thus, although Duchesne's book and article take the form of a scientific argument (at one point he praises Charles Murrey's *Human Accomplishment* for a systematic application of "scientific standards of reliability and validity"), his overall goal is to pass a value judgment on the achievement, creativity, significance, vigor, excellence, etc. of the Western Civilization. *The Uniqueness of Western Civilization* is, thus, a reaction against the opposite view that Western Civilization is the source of much that is wrong with the modern world. The overall opinion (by the majority of scholars) on this issue has swung back and forth, with the unapologetic, and even unconscious Eurocentrism holding the sway in the nineteenth and early twentieth century, while the opposing Multiculturalism gaining the upper hand since the 1960s (Hewson 2012).

The problem with both of these extremes is that ultimately they aim to pass judgment on what is *good* and what is *bad*. But such questions belong to the realms of moral philosophy, religion, and ideology, rather than science. Science, on the other hand, is ultimately concerned with *truth* (and, yes, we can never achieve the absolute truth, but the goal is to approach it as closely as we can).

This is not to deny that scientists are motivated by other considerations—certainly, goodness (unless one aspires to become a mad scientist of the comic books) and also beauty, prestige, etc. Theories, for example, can be elegant and even beautiful. However, when these other considerations come in conflict with truth, they are always trumped by it. Thus, many a beautiful theory has been slain by ugly facts.

Similarly, sometimes the application of the scientific method leads us to conclusions that we may find unpalatable from the moral point of view. The temptation is to allow a consideration of goodness to trump that of truth. However, the logical mistake of mixing up descriptive statements ('what is') with normative or prescriptive statements ('what ought to be') has been known to philosophers at least since David Hume. Furthermore, in practical terms we have a much better chance of changing the state of things to what they ought to be, when we have a clear and unbiased understanding of what they currently are. Generally speaking, when considerations of ideology are allowed to trump those of science, we end up with bad science.

The Problematic Aspects of *The Uniqueness*

I see two serious problems with Duchesne's work. The first one is how he resolves the intrinsic tension between his ideological goals and the requirements of the scientific method. Despite an impressive amount of scholarship reflected in the book, allowing ideology to drive the agenda leads

to predictable results. I will only give one example here (Christopher Beckwith's critique in this issue of *Cliodynamics* can be consulted for many others).

One major argument in *The Uniqueness of Western Civilization* is that Europeans were a "Civilization of Explorers." This argument is further developed in a subsequent article (Duchesne 2012). The article devotes a section to the achievements of each of the following people: the Greeks, the Vikings, the Portuguese, and the Spanish. One may argue with Duchesne's characterization of the Phoenicians, the Arabs, and the Chinese as inferior explorers and navigators, but there is another, even more glaring omission: the Polynesians. There can be no question that before the Age of Exploration (in other words, before the fifteenth century) the greatest oceanic explorers were the Polynesians. However, they are mentioned in the article only once (in a dismissive sentence that the Polynesians "did not cultivate a body of geographical knowledge").

Such treatment completely ignores the remarkable achievement of the Polynesians. These fearless and accomplished seafarers explored and settled the largest body of water on Earth—the Pacific Ocean. Their truly heroic feats—crossing thousands of kilometers of open water to colonize the Hawaiian Islands, for example—are without parallel in the pre-modern world. In comparison, the Greeks timidly hugged the shores of the Mediterranean, and preferred to spend the night on land. Recent evidence suggests that the Polynesians explored essentially the entire Pacific Ocean (except for its Arctic and Antarctic regions), and probably discovered the Americas. Otherwise, how could they possibly obtain South American sweet potatoes, which became a staple of the Polynesian diet centuries before the arrival of the Europeans (Roullier et al. 2012)?

There is a second problematic aspect of *The Uniqueness of Western Civilization*, which is shared by most of the broader literature on the 'Rise of the West.' While there is universal agreement among scholars that for about two centuries a number of European societies pulled away from the rest of the world in terms of power, technology, economy, and science, how and why this happened is a matter of ongoing controversy. Duchesne, for example, traces "persistent creativity from ancient to modern times of across all fields of human thought and action" of Western Civilization to periodic infusion of aristocratic war bands, starting with Indo-Europeans (this is Duchesne's Aristocratic Personality Thesis to which I will return later).

However, there are serious methodological difficulties in explaining the unique and the peculiar. This does not mean that the question 'Why Europe?' (Goldstone 2009) or, even better, how do we explain the Great Divergence (Pomeranz 2000), cannot be addressed scientifically. One particularly fruitful approach is to put any particular instance (such as the Rise of the West) in a generic category, e.g. 'efflorescences' (Goldstone 2002), or 'upsweeps' (Inoue

et al. 2012). We can then test various explanations using the comparative method or, more formally, construct a database with which to test theories. Naturally, there are many difficulties with conducting such a research program, and it is not guaranteed to succeed (for example, if there are too few cases for a statistical analysis). But at least such an approach is on a firm logical ground (I will return to this issue below).

Most of the literature on the Rise of the West, on the other hand, approaches this question in a reverse (and I would argue logically flawed) fashion: starting with the observation itself, noting something peculiar or exceptional about Europe, and building an explanation based on that. However, any world region, or any human society has a multitude of peculiarities that distinguish it from other regions, or societies (see the article by Jack Goldstone in this issue for a list of such unique economic or cultural features proposed by various authors for Europe). Different explanations favored by particular authors often focus on either aspects on which they are expert (e.g., demography or geography), or on explanations that they are primed to favor on ideological grounds. There is a kind of ‘inverse cherry-picking’ flavor to such exercises. Whereas the usual cherry-picking is selecting only those facts that fit one’s favored theory, in this case explanations are cherry-picked to fit what needs to be explained. Neither approach, needless to say, is consistent with the scientific method.

I am not condemning the literature on the Rise of the West wholesale. Over the last two decades we have made much progress in understanding both the theoretical and empirical issues involved in this difficult question (difficult because of methodological issues discussed above, and also because it is so heavily ideologized). One particularly useful approach has been to focus on one theoretical explanation at a time, amass comparative data relevant to the theory, and then analyze whether this particular explanation is supported, or not. Implicit (and sometimes explicit) in this approach is the use of general theories. For example, the new understanding of the role of institutions in sustaining economic growth and political stability has provided a theoretical basis for two recent and influential contributions to the debate: *The Origins of Political Order: From Prehuman Times to the French Revolution* by Fukuyama (2011) and *Why Nations Fail: The Origins of Power, Prosperity, and Poverty* by Acemoglu and Robinson (2012). Note also that both books chose to address *general* questions of why nations succeed or fail, rather than focus on a *unique* instance of the Rise of the West (or why the Industrial Revolution originated in Great Britain).

As a result of this work, especially by the scholars belonging to the Californian School (reviewed in Goldstone 2009), much of the theoretical and empirical ‘clutter’ has been cleared off. It is possible to make progress by rejecting theories on the basis of their logical or empirical failings (or both).

I will return to this point in the Conclusion. But first, the next two sections will deal with two myths of European exceptionalism that are discussed by Duchesne and, even more importantly, still have broad currency in the historical literature: the supposed geographic uniqueness of Europe and the so-called Western Way of War.

Is Europe “Geographically Unique”?

One major difficulty with the argument of Duchesne that traces the characteristics of the Europeans to the “primordial” features of the Indo-Europeans is that various peoples speaking Indo-European languages spread into many parts of Eurasia (Central and East Asia, India, Iran and the Middle East), but only in Europe they gave rise to the unique Western Civilization. One possible explanation that Duchesne offers is that “Europeans were the accidental beneficiaries of an environment that stimulated certain psychosomatic traits.”

Claims that Europe’s geography is unique are often invoked in explaining European exceptionalism. The problem is that such claims are often mutually contradictory (as we shall see when we compare the views of two eminent scholars below). Duchesne devotes a substantial amount of discussion in his book to the observations by Barry Cunliffe in *Europe between the Oceans* (2008). Chapter 2, “The Land between the Oceans”, which surveys European geography begins as follows: “One of the greatest attributes of the straggling peninsula of Europe, with its deeply convoluted coasts and its island fragments scattered all around, is the sheer length of the interface between land and sea.” Cunliffe then writes of the rivers that “crisscrossed the European peninsula” and the North European Plain, “the Middle European Corridor leading from the Atlantic to the Black Sea.” The main gist of Cunliffe’s geographic overview is that Europe is internally well connected, with ease of travel, especially water-borne travel, in all compass directions. Duchesne uses this observation to argue that the European topology and landscape were “a crucial geographic component in the formation of Europe’s uniquely restless culture.”

However, imagine an interstellar traveler, who arrived in a spaceship at any time before 1500 (thus, no knowledge of the ‘European Miracle’). As this unprejudiced observer looks down on the Earth from the orbit, it would not see anything special about Europe. Yes, Europe has a convenient corridor for East-West movement, but there are many even greater corridors in Eurasia. The most notable of these is the Great Eurasian Steppe, and the area just south of it, through which passed several long-distance trading routes, collectively known as the Great Silk Road.

In terms of sea-based connectivity, Europe looks quite good, with its Mediterranean Sea and many peninsulas and islands. However, our unprejudiced interstellar traveler would also note another ‘Mediterranean’ sea

at the opposite end of the Eurasian landmass—the South China Sea (Casino and Shin 1999). In fact, South and East China seas together look remarkably similar to Eastern and Western Mediterranean, except oriented along a South-North, rather than an East-West axis. Certainly, if our interstellar observer looked for the largest and most island-rich region on Earth, its eye would naturally be drawn to the Southeastern Asian Archipelago.

Returning to the issue of the deeply indented coastline, Cunliffe, and Duchesne following him, interpret it as evidence for connectivity. But such an interpretation is not uniformly shared by other scholars. In fact, a much more commonly held view is that indented coastline imposed *barriers* that partially explain the contrast between politically fragmented Europe and perennially centralized China.

For example, Jared Diamond (1999) argues as follows (a similar argument is found in another popular book, Kennedy 1987):

So the real question is, why was China chronically unified, and why was Europe chronically disunified? Why is Europe disunified to this day? The answer is geography. Just picture a map of China and a map of Europe. China has a smooth coastline. Europe has an indented coastline, and each big indentation is a peninsula that became an independent country, independent ethnic group, and independent experiment in building a society: notably, the Greek peninsula, Italy, the Iberian Peninsula, Denmark, and Norway/Sweden. Europe had two big islands that became important independent societies, Britain and Ireland, while China had no island big enough to become an independent society until the modern emergence of Taiwan. Europe is transected by mountain ranges that split up Europe into different principalities: the Alps, the Pyrenees, Carpathians — China does not have mountain ranges that transect China. In Europe big rivers flow radially — the Rhine, the Rhone, the Danube, and the Elbe — and they don't unify Europe. In China the two big rivers flow parallel to each other, are separated by low-lying land, and were quickly connected by canals. For those geographic reasons, China was unified in 221 B.C. and has stayed unified most of the time since then, whereas for geographic reasons Europe was never unified. Augustus couldn't do it, Charlemagne couldn't do it, and Napoleon and Hitler couldn't unify Europe. To this day, the Europe[an] Union is having difficulties bringing any unity to Europe.

As we see, the same geography leads two eminent authors to very different conclusions. In my opinion, Barry Cunliffe is much closer to truth than Jared Diamond.

First, let us discuss how different features of terrain promote or impede state formation and spread from the general, theoretical point of view. The general principle is that anything that promotes ease of travel and communications should have a positive effect on state growth and expansion. In contrast, any geographic feature that creates barriers to movement should have a negative effect on state formation. Topography (ruggedness of the landscape; most strikingly, the difference between plains and mountains) is the most obvious such variable (as Jared Diamond correctly points out in the quote above). Mountainous terrain provides natural defenses that make societies inhabiting such areas much harder to conquer. Furthermore, rugged areas interrupt easy communications; it is harder to move goods, people, and information across such terrain. So states encompassing mountainous areas have to work harder to move armies and messengers across these areas, extract resources, and to assimilate highlander population to the imperial culture.

However, bodies of water, such as major rivers, narrow straits, and inland seas, are not dividers, but connectors. Occasionally, they may serve as ‘moats,’ but the overall effect is to promote communications rather than impede them. Moving bulk goods and armies is much cheaper by water than by land. Historians noted long ago that most ancient Old World empires were associated with major rivers (the Nile, Tigris and Euphrates, Indus, Yellow River, etc.).

Inland seas have the same effect. The Mediterranean is the best example (Braudel 1972, Horden and Purcell 2000), as it was extremely important as the conduit for genes, ideas, armies, and goods. It was the road that the ‘Sea People’ used to wreck the Bronze Age civilizations and by the Phoenicians and the Greeks expanding in the opposite direction. Roman Empire would have been impossible without the Mediterranean, which was known as *Mare Nostrum* (‘Our Sea’).

The peninsulas of Europe were well connected by inland seas and, as a result, were repeatedly unified within single states. In addition to Roman Empire, many later states incorporated two or more of these peninsulas: Byzantium, which briefly reconquered most of the Mediterranean (and even during its weakest periods it had a foothold in both the Balkans and Anatolia). The Ottoman Empire later replaced the Byzantium and unified most of the Mediterranean from Algeria to the Balkans. Spain controlled Italy, in addition to the Iberian peninsula) for many centuries and France conquered Algeria. There is abundant empirical evidence that internal seas are no impediment to imperial expansion (a neat division with each peninsula being controlled by a separate country, which we see on the map today, is historically quite unusual).

With respect to physical relief, the argument of European geographic exceptionalism fails on empirical grounds. The best way to see it is by viewing different parts of Eurasia with an interactive topographic map that allows one to zoom in and out (I used TopoMapper.com). Figure 1 presents two screenshots from TopoMapper, focusing on the western and eastern ends of Eurasia (I also added a few text labels pointing to the places mentioned in the following discussion).

Although Europe is divided by a series of mountain ranges (e.g., the Pyrenees, Alps, and Carpathians) into a Northern and a Mediterranean parts, North of these ranges Europe is very flat. The North European Plain (or the Middle European Corridor, in Barry Cunliffe's characterization) runs from France and the Netherlands (where it is narrowest) through Germany and Poland to Ukraine and Russia (where it becomes very broad). There are no significant barriers within it to the movement of conquering armies. As a result, Paris has fallen to the Russians and the Germans (on multiple occasions) and Moscow to the Poles, the French, and (nearly) the Germans. Such temporary conquests did not lead to a lasting unification of Europe, but the reason is not geography or, at least, not topography.

In contrast to Europe, China is much more cut up by mountain ranges. One of the most important capital cities, Xian, the capital of the first (Qin) and many other unifying states is so well cut off from the rest of China by mountains that the area where it is located (the Wei River Valley) is known as the 'Land between Passes.' Inversing the argument advanced by the proponents of Europe's geographic exceptionalism, some Chinese historians have argued that the Wei River Valley served as the unifying center precisely because it is a good defensive base from which to expand (this is another example of 'theoretical cherry-picking').

Other mountain ranges cut off northern China from the Sichuan basin (with the provincial capital of Chengdu) and southern China (Guangdong, with the provincial capital of Guangzhou). While the eastern plain of China is indeed flat, it was not the Yangzi valley or the lower Huang He that served as nuclei from which China was unified. Instead China was invariably unified from the northwest (Xian area) or from the north (Beijing area) (Turchin 2009).

Not only was China disadvantaged from the point of view of being cut-up with mountain ranges, its river system also leaves much to be desired, from the transportation point of view. Europe has rivers flowing in all compass directions, so it is easily crossed lengthwise and in trans-peninsular directions (Cunliffe 1994: 38). China, in contrast, is dominated by rivers flowing from west to east. This makes it difficult to move bulk goods in the North-South direction. The Chinese solved this problem with a truly remarkable piece of engineering—the Grand Canal (length = 1776 km). But it was not the Canal that made unification possible; it was political unification that made building the Grand Canal possible.

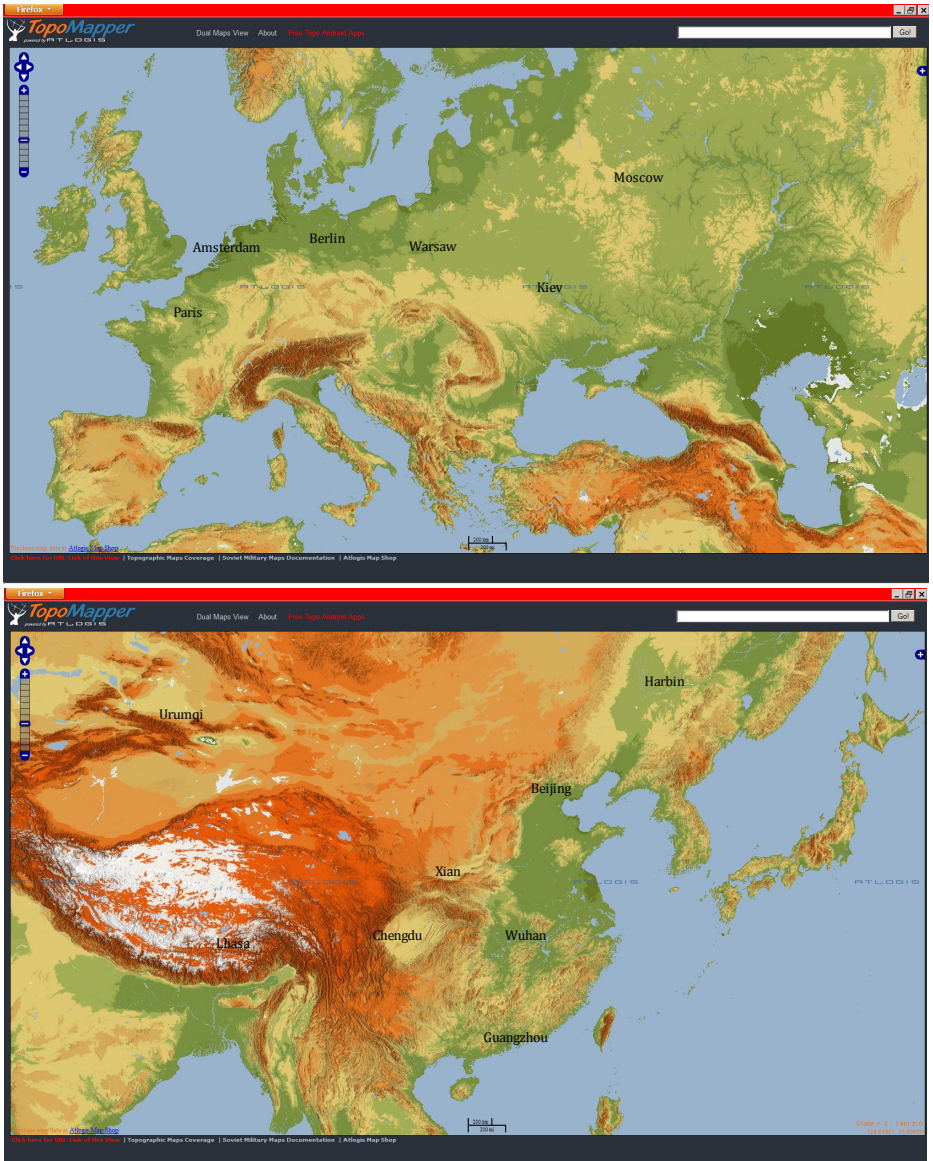


Figure 1. Topographic maps of Europe and China (from TopoMapper.com).

West-east flowing rivers and mountain ranges made southward expansion from the Wei River/Yellow River core quite problematic. An additional difficulty for unifying China is that what plains it has are oriented along a North-South axis, unlike the West-East orientation of the Northern European Plain. Our recent analysis of shapes of historical empires (expanding on Jared Diamond's ideas) suggests that territorial expansion is easiest in West-East direction, into areas that have similar climate and ecology (Turchin et al. 2006). By the eighteenth century China achieved a remarkable feat by unifying such diverse climatic and ecological regions as cold-temperate Manchuria (provincial capital: Harbin), tropical Guangdong (Guangzhou), extremely arid Xinjiang (Urumqi), and the high-elevation plateau of Tibet (Lhasa). Even extending political control from the North into the Yangzi River valley presents serious difficulties for a would-be conqueror, because it has such a different terrain and environment than North China. Whereas in the North cavalry reigns supreme, the South can only be conquered by a river navy. One famous example of a failed attempt to do so was the defeat of the Northern army at the Battle of Red Cliffs in 209 CE (near present-day Wuhan). Much later in the thirteenth century the Mongols faced similar difficulties. While the Mongol armies were devastating Europe (7,000 km away) already during the 1240s, they managed to conquer the Yangzi valley only in the 1270s.

If geography made the unification of China much more difficult than doing the same for Europe, why did Europe and China have such divergent political histories? The first step to explaining this divergence is to realize that there is nothing particularly unique about European political disunity. Most world regions had a similar history of fitful, partial, and short-lasting attempts at unification. Let us return to Southeast Asia, the other Eurasian peninsula in many ways similar to Europe. Over most of its history, mainland Southeast Asia typically had at least three concurrent states (and often more), approximating the present-day Myanmar, Thailand, and Vietnam (Lieberman 2003, 2010).

What is really unique is not Europe, but China—there are no other world regions that were so consistently unified by a megaempire during the last two millennia. Despite its uniqueness, the remarkable imperial history of China is a result of the operation of general historical forces (see Turchin 2009, 2011b).

The Uniqueness of the ‘Western Way of War’?

The idea of “the Western Way of War” was first proposed by Victor Davis Hanson (1989) and subsequently supported by such influential military historians as John Keegan and Geoffrey Parker. The *Cambridge History of Warfare* edited by Parker (2005), in particular, argued that originating with

the heavily armed infantrymen of Greece (hoplites), “war in western societies has followed a unique path leading to western dominance of the globe.”²

So what are the characteristics of this “unique path”? In *The Western Way of War: Infantry Battle in Classical Greece*, Hanson (1989) argued that the Greeks invented “the central act of Western warfare, the decisive infantry battle. Instead of ambush, skirmish, or combat between individual heroes, the Greeks of the fifth century B.C. devised a ferocious, brief, and destructive head-on clash between armed men of all ages.”

In fact, “the decisive infantry battle” relying on “destructive head-on clash” is a fantasy from the point of view of military history. Hanson’s argument is highly Eurocentric; in fact, it is almost entirely based on the writings by the Greeks themselves about the Greco-Persian wars of the first half of the fifth century BCE. Broader lessons from pre-modern Eurasian warfare, however, suggest that attacking the enemy on foot with close-range weapons (spears, swords, etc.) is a very inferior way of winning battles, especially if the enemy is reasonably proficient with projectile weapons. Furthermore, winning a battle is very different from winning a war.

The Persian version of history is much less known, than the Greek one, because Persians left few texts to inform us. However, everything that we know about Achaemenid history suggests a very different view of the Greco-Persian wars from that held by the Greeks (and uncritically accepted by Hanson). The Achaemenid state (c.550–330 BCE) was an unparalleled achievement for its time. It was the first mega-empire of the Axial Age (c.800–200 BCE), extending from India to Macedon (most non-specialists do not realize that Macedon was part of the Persian empire for a time). Conquering the highly fractious region of Greece (there were perhaps 700 independent polities there) far away from the center was not an important goal for the empire. It was much more interested in such wealthy regions as Mesopotamia or Egypt.

Persian military operations in Greece suffered from two difficulties. One was logistics. While the Greeks fought close to home, the Persian army was at the end of a very long chain of supply. The Athenians could require their troops to bring their own food rations with them when they mustered to repel an invading army, whereas the Persians had to spend several years gathering supplies in the preparation for the invasion. Second, the heavily armored infantry was indeed much better suited to defending the rugged terrain of Greece against the Persian cavalry.

Despite Hanson’s thesis, during the Persian wars the Greeks’ strategy was not to defeat their opponents in a decisive battle. Instead they relied on defending narrow passes against the invader. Even despite this advantage, the

² It should be noted that Parker’s version of the Western Way is quite different from Hanson’s version. My critique explicitly addresses Hanson’s formulation.

Greek record against the Persians was a checkered one. They won some battles, and lost others. Furthermore, the Persians actually achieved the stated goal of their campaign, by overrunning and razing the two Greek cities that they wanted to punish for supporting the Ionian revolt, Plataea and Athens.

Even after the Greeks succeeded in repelling Persian invasions, their ‘Western Way of War’ did not lead to anything resembling “global dominance” or even regional dominance. From a broader Eurasian point of view the Greek experience of war was very parochial. Typical warfare between Greek poleis during the Classical age was small-scale and easy to organize. It essentially consisted of mustering the citizens (each bringing his own arms and rations, so no logistical problems to solve) and walking to the next polis (which was just a few days of travel away). The invader then burned some crops and cut down a few olive trees to induce the opponent to agree to battle. Then came that “destructive head-on clash between armed men” so extolled by Hanson. After the battle the two city states made peace, with the winner getting a much better deal than the loser.

This type of warfare requires very intense cohesion between the warriors manning the phalanx, and the Greeks excelled at it. As a result, the Greek heavy infantry was much in demand as mercenaries in Persia and elsewhere. But the Greek way of war was also a very inconclusive kind of warfare. The Greek poleis fought with each other, but there was no systematic increase in the scale of Greek societies during the Classical Age (until the Macedonians came on the scene).

Building a large empire requires a more sophisticated way of war. In particular, it becomes necessary to create a large-scale organization for raising, moving, and supplying the troops. Imperial armies must be able to fight hundreds and sometimes thousands of kilometers away from the metropole (for example, Athens is nearly 3,000 km away from Persepolis). It requires coordination and cooperation on a very large social scale, something that the Greeks never learned how to do.

The Macedonians, who learned the Game of Empire very well, used a different style of warfare from that described by Hanson. Alexander indeed excelled at winning battles by “destructive head-on clash between armed men,” but his main shock troops were cavalry, not infantry (Macedonians may have developed cavalry to become an important part of their army as a result of being part of the Persian empire, or because of their closer proximity to the horse-rearing areas, or both). Even more important, Alexander was a master of logistics and “his meticulous attention to the provisioning of his army” was as important to his military victories as his tactics and strategy (Engels 1980).

Both logistics and battlefield tactics of Alexander relied on the most important military technology of premodern warfare—the horse. Domestication of transport animals—the horse, other equids (donkey, onager, and donkey-horse hybrid, mule), and camelids (Dromedary and Bactrian

camels)—transformed warfare in many ways. Alexander used both horses and mules and, later in his campaigns, camels to rapidly move his troops and supplies on campaign (Engels 1980).

The main value of the horse in premodern military operations was not just its ‘shock’ value (although cavalry charges won many battles). More important is the mobility that it confers on the army. During the campaign the army that can better concentrate its regiments to achieve local superiority over the enemy will have a better chance at winning battles.

The mobility of steppe horse-riders is what made them so difficult to defend against for agrarian empires. When the agrarian state concentrated its forces in one place, the nomads simply raided the undefended villages and towns elsewhere. But if the agrarian army was spread out to defend the towns, the nomads concentrated their forces and defeated the agrarian contingents in detail.

It did not take a long time, only a few painful lessons, for the agrarian empires to realize that they had to acquire their own mobile forces. Buying horses from the steppe dwellers or establishing their own horse-breeding programs became an important preoccupation of Eurasian empires all the way into the nineteenth century (for a fascinating account of the role of horses in the fall of the Napoleonic empire, see Lieven 2010).

The main reason why the Greeks did not rely on cavalry is clearly because of their physical and ecological environment. Horses need grassy plains to thrive, and in Greece there was only one region suitable for raising horses, Thessaly. It should come as no surprise that Thessalians were renowned as horse breeders and riders. As we move further north into Macedonia and, especially, Thrace, the Balkans become even more suitable for horse-breeding.

In addition to its strategic value, mobility resulting from the use of horses provides a decisive advantage at the tactical level. On the battlefield mounted troops can choose when to engage the enemy, and when to disengage. This advantage becomes even more important when horses are coupled with projectile weapons, which became possible with the invention of the powerful compound bow that could be shot from the horseback (Christian 1998).

In a terrain where they have room to maneuver mounted archers have a great advantage over infantry wielding short-range weapons such as spears and swords. Horse riders can shoot arrows at infantry at their leisure, riding away when the infantry attempts to charge them, and then coming back when foot soldiers become exhausted chasing the elusive horsemen. The paradigmatic example illustrating this advantage is the Battle of Carrhae in 53 BC between an invading Roman army, which was predominantly infantry, and Parthian cavalry. The Parthians defeated the Romans despite being heavily outnumbered. They accomplished this task by shooting literally millions of arrows at the Romans.

At first, the Roman hope was that the Parthians would eventually run out of arrows, but this hope was dashed with the arrival of heavily laden camels that resupplied Parthian archers. The Romans knew how to defend against archers, by forming a ‘testudo’ (a turtle), in which the legionaries locked their shields to present a seamless barrier to missiles. However, the Parthian army included a regiment of heavy cavalry (cataphracts). When the Romans formed testudos, they were charged by the Parthian cataphracts and forced to form into lines, again exposing the Romans to the withering storm of arrows from horse archers. Eventually, the Roman army was completely destroyed (with twenty thousand killed and ten thousand surrendered).

The superiority of the “decisive clash” with close-range hand-held weapons can only be supported by a highly Eurocentric focus on military history, and even that ignores the terrifying effectiveness of such missile troops as Genoese crossbowmen and English archers, which proved their value in innumerable battles and sieges. During the medieval period such troops were the next best thing to mounted archers, because they typically used horses for strategic mobility, while dismounting for battle (European armies could not field horse archers because compound bows do not work well in humid climates).

The real, rather than imaginary Western Way of War put a much greater reliance on ranged weapons as they became perfected. By the late Middle Ages English archers were capable of defeating much larger armies of French knights at Crécy and Agincourt. Towards the end of the Hundred Years War, when the French gained the upper hand, they turned the tables on the English not by charging them and cutting them down with swords and battleaxes, but by employing a new projectile weapon—cannon. After the Military Revolution of the fifteenth and sixteenth centuries (Roberts 1956) western armies fought almost exclusively with ranged weapons—cannon and muskets.

The recipe for “western dominance of the globe” in the early-modern period has nothing to do with Greek warfare. Instead it bears a striking similarity to the recipe used by steppe horsemen who dominated premodern Eurasia. While steppe horsemen used a combination of the horse (for mobility) and compound bow (as a ranged weapon), early modern Europeans relied on the ocean-sailing ship and cannon (Turchin 2011a). In modern warfare most of the time the combatants are so far apart that they don’t even see each other. The ultimate distance weapon, the Predator drone, allows its operator to control it from thousands of miles away.

In summary, there are a number of problems associated with the idea of the Western Way of War, including its insistence on (1) the supremacy of infantry over cavalry, (2) the supremacy of shock (close-quarters) combat over ranged weapons, and (3) its emphasis on the “decisive battle.” Even if it is a reasonable approximation of how the Greeks waged war in Classical times, it certainly does not describe early modern and modern European way of war. It was mobility and firepower that underwrote Western domination of the globe

(as well as the economic, institutional, technological, and scientific advances that made modern fleets and armies possible).

As a final note, one aspect of the Western Way of War thesis, with which I find myself in agreement, is the emphasis on the importance of discipline and drill (I would argue, however, that Europeans were far from unique in this respect). As I mentioned above, military historians Hanson and Parker have fairly divergent views on what constitutes the Western Way, but discipline and drill feature prominently in both versions. More broadly, there is a universal agreement among both military historians and military professionals that without discipline armies are worthless. The very first thing that all modern armies teach their recruits is not knowledge of weapons, but the habit of discipline and obedience to orders.

There is a curious dissonance between this universally held maxim and Duchesne's Aristocratic Personality Thesis, according to which the uniqueness of the Western civilization is due to war-bands of aristocrats variously described as egalitarian, libertarian, individualistic, heroic, free, competitive, and prestige- and honor-seeking. It is difficult to imagine a setting less conducive to "a life of aristocratic equality, vigorous, free, and joyful activity" than the boot camp (except for "vigorous").

A band of individualistic prestige-seeking heroes is a commander's worst nightmare and a recipe for military disaster. Duchesne's description of the aristocratic personality is actually a fair approximation of the view (not a flattering one, needless to say) that Romans held on the Gauls. More generally, when members of the team place their individual goals first and compete with each other for prestige and personal recognition, the capacity of the team for concerted action is greatly reduced, not only in war but in any activity that requires cooperation; in other words, any socially meaningful activity (Turchin 2013).

Conclusion

History is a discipline that is particularly prone to be misused for ideological purposes. Anyone who knows history well enough can find multiple historical examples to support any particular theory—and a different set to support its logical opposite. This doesn't mean that history is hopeless; it just means that we have to be careful about how we test our notions about the past. In particular, no cherry-picking is allowed. A fair test of any theory must rely on a data set that includes all cases within a certain, objectively specified sampling universe. We also need to worry about biases that may affect data, including political agendas of chroniclers and their rulers or physical processes that may make some artifacts more persistent in the archaeological record than others. This is of a less pressing concern because source analysis and taphonomy are now standard techniques for professional historians and archaeologists.

So much is fairly obvious, although it is equally clear that ideologues of various stripes will not stop misusing history in pursuit of their agendas. A more difficult question is how we can study unique events, such as the great divergence between the West and the Rest during the early modern period. What are valid scientific approaches to this difficult, yet fascinating question with potentially far-reaching policy implications? I'd like to end this article on a positive note by offering a view of how this issue may be approached from a cliodynamical point of view.

All historical events are unique, but a valid explanation of the event must involve a mixture of unique and generic features. Consider, for example, the Cretaceous–Paleogene extinction event that killed off most dinosaurs. Currently the best explanation of this mass extinction is the Alvarez impact theory (Schulte et al. 2010). The explanation is based on a unique event: a huge asteroid hitting the Earth ~65.5 million years ago. How have natural scientists built their case?

They start with unique features—the asteroid impact, how big it was and where it hit (also, that there was an Earth and it had a certain kind of biota, etc.—it is easily forgotten that all such factors must be included in the account). The next step, however, is to start building linking the impact to extinction. The unique features provide 'boundary and initial conditions,' while general theories allow investigators to build dynamic models for postulated processes. For example, a big issue is what were the environmental consequences of the asteroid impact, and climate simulations suggest that the impact was followed by a long period of global darkness and cooling.

Finally, the models generate predictions that can be tested against the patterns in the fossil record. The conclusions of Schulte et al. (2010) have not been universally accepted by all scientists (see the scientific correspondence associated with their article). However, nobody can deny the huge scientific progress that took place since the Alvarez hypothesis was proposed in 1980. This is a fine example of rapid-discovery science (Collins 1994) dealing with a unique historical event. Nothing prevents us from applying the same approach in historical social science.

We can (and should) apply the same method to explaining the Great Divergence, or answering an even more focused question, the beginning of the Industrial Revolution in Great Britain. Again, the unique features of Great Britain (geography, demography, social structure, etc.) provide the initial and boundary conditions for dynamic models. Next, it is important to realize that the Industrial Revolution was a complex event that involved rapid changes in many distinct spheres, although these were connected by feedback loops. Thus, we need to have separate models addressing such questions as: How was agricultural productivity improved? Why did England escape the Malthusian trap? What were the causes of institutional change, leading to government becoming more responsive to populace? Why did the pace of scientific and

technological change accelerate? And many others. Each of these questions can be modeled, with models used to make predictions to be tested against the historical record (in the same way as the climate models and the fossil record were used to test the Alvarez hypothesis).

There is one big difference between explaining the Cretaceous–Paleogene extinction event and explaining the Great Divergence. Climate models have undergone much development during the last few decades, and while we don’t have complete understanding of how and why climate changes, we do have reasonable models with which to simulate the environmental effects of an asteroid impact. In this respect historical social sciences lag behind historical natural sciences. In a few cases, we have reasonable models (e.g. demography), but usually this is not the case (for example, how do we model technological change).

My overall conclusion is that, although questions as to why the Great Divergence occurred are fascinating and important, the state of historical social science does not yet permit us to develop a rigorous research program (similar to the one associated with the Alvarez hypothesis). However, fifty years ago geologists, climatologists, and evolutionary biologists were in a similar state—they did not have the tools to do what they are doing now. The first order of business for us, then, is to develop general theories of social change that will provide us with the tools to answer questions about unique events such as the Great Divergence, the Industrial Revolution, why the Roman Empire fell, and many others. Building and empirically testing such general theories about history seems to me to be a much more productive way of utilizing our collective energies and talents. And that is, of course, what Cliodynamics is all about.

Acknowledgment

I thank Christopher Beckwith, Jack Goldstone, and Martin Hewson for comments on early versions of the manuscript. Several ideas in this article were first aired as blogs on the *Social Evolution Forum*. Many thanks to the *Forum* participants for their insightful comments, which led me to refine my thinking on these issues.

References

- Acemoglu, D. and J. Robinson. 2012. *Why Nations Fail: The Origins of Power, Prosperity, and Poverty*. Crown, New York.
- Braudel, F. 1972. *The Mediterranean and the Mediterranean World in the Age of Philip II*. Harper and Row, New York.
- Casino, E. S. and M. Shin. 1999. South China Sea or “Asian Mediterranean Sea”: Re-Conceptualizing a Common Regional Maritime Zone. *International Area Studies Review* 2:43-64.

- Christian, D. 1998. *A History of Russia, Central Asia, and Mongolia*. Blackwell, Oxford.
- Collins, R. 1994. Why the social sciences won't become high-consensus, rapid-discovery science. *Sociological Forum* 9:155-177.
- Cunliffe, B., editor. 1994. *The Oxford illustrated prehistory of Europe*. Oxford University Press, Oxford.
- Cunliffe, B. 2008. *Europe between the Oceans: Themes and Variations: 9000 BC-AD 1000*. Yale University Press, New Haven.
- Diamond, J. 1999. *How to Get Rich*. The Edge.
- Duchesne, R. 2011. *The Uniqueness of Western Civilization*. Brill, Leiden.
- Duchesne, R. 2012. A Civilization of Explorers. *Academic Questions* 25:65-93.
- Engels, D. W. 1980. *Alexander the Great and the Logistics of the Macedonian Army*. University of California Press, Berkeley, CA.
- Fukuyama, F. 2011. *The Origins of Political Order: From Prehuman Times to the French Revolution*. Farrar, Straus and Giroux, New York.
- Goldstone, J. A. 2002. Efflorescences and Economic Growth in World History: Rethinking the "Rise of the West" and the Industrial Revolution. *Journal of World History* 13:323-389.
- Goldstone, J. A. 2009. *Why Europe? The Rise of the West in World History: 1500-1850*. McGraw Hill, Boston.
- Hanson, V. D. 1989. *The Western Way of War: Infantry Battle in Classical Greece*. Knopf, New York.
- Hewson, M. 2012. Multicultural vs. Post-Multicultural World History: A Review Essay on *The Uniqueness of Western Civilization* by Ricardo Duchesne. *Cliodynamics* 3:306-324.
- Horden, P. and N. Purcell. 2000. *The Corrupting Sea: A Study of Mediterranean History*. Wiley-Blackwell, New York.
- Inoue, H., A. Álvarez, K. Lawrence, A. Roberts, E. N. Anderson, and C. Chase-Dunn. 2012. Polity scale shifts in world-systems since the Bronze Age: A comparative inventory of upsweeps and collapses. *International Journal of Comparative Sociology* 53:210-229.
- Kennedy, P. 1987. *The Rise and Fall of the Great Powers: Economic Change and Military Conflict from 1500 to 2000*. Random House, New York.
- Lieberman, V. 2003. *Strange Parallels: Southeast Asia in Global Context, c.800-1830. Volume I: Integration on the Mainland*. Cambridge University Press, Cambridge.
- Lieberman, V. 2010. *Strange Parallels: Southeast Asia in Global Context, c.800-1830. Volume II: Mainland Mirrors, Europe, China, South Asia, and the Islands*. Cambridge University Press, Cambridge.
- Lieven, D. 2010. *Russia against Napoleon: The True Story of the Campaigns of War and Peace*. Viking, New York.
- Parker, G., editor. 2005. *The Cambridge History of Warfare*. Cambridge University Press, Cambridge.

- Pomeranz, K. 2000. The great divergence: China, Europe, and the making of the modern world economy. Princeton University Press, Princeton, NJ.
- Roberts, M. 1956. The Military Revolution, 1560–1660, Belfast.
- Roullier, C., L. Benoit, D. B. McKey, and V. Lebot. 2012. Historical collections reveal patterns of diffusion of sweet potato in Oceania obscured by modern plant movements and recombination. PNAS 110: 2205–2210.
- Schulte, P., L. Alegret, I. Arenillas, J. A. Arz, *et al.* 2010. The Chicxulub Asteroid Impact and Mass Extinction at the Cretaceous-Paleogene Boundary. Science 327: 1214–1218.
- Turchin, P., J. M. Adams, and T. D. Hall. 2006. East-West Orientation of Historical Empires and Modern States. Journal of World-Systems Research 12:219-229.
- Turchin, P. 2009. A Theory for Formation of Large Empires. Journal of Global History 4:191-207.
- Turchin, P. 2011a. Strange Parallels: Patterns in Eurasian Social Evolution. Journal of World-Systems Research 17:538-552.
- Turchin, P. 2011b. Warfare and the Evolution of Social Complexity: a Multilevel Selection Approach. Structure and Dynamics 4(3), Art. 2:1-37.
- Turchin, P. 2013. The Puzzle of Human Ultrasociality: How Did Large-Scale Complex Societies Evolve? Pages 61-73 in P. J. Richerson and Morten H. Christiansen, editors. Cultural Evolution. MIT Press, Cambridge, MA.