

Article Type: Book Review Essay

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Review of:

Payne, Kenneth. *Strategy, Evolution, and War: From Apes to Artificial Intelligence*. Georgetown University Press. 2018.

In this brilliant book, Payne traces the emergence of strategic thinking to its origins in human evolution. Building on evolutionary psychology's social brain theory, he argues that conflict—particularly war—selected for the willingness and ability to cooperate, not just with close relatives but with larger groups. One's likelihood of survival was enhanced by being able to imagine other people's goals in order to coordinate action with them. As we evolved during the prehistoric hunting and gathering phase (comprising over 99 percent of human history), our minds were shaped by the need to think about deadly competition with other groups, which was a constant threat. Consequently, humans developed a strategic type of intelligence. There were other reasons than warfare to cooperate in large groups, such as hunting, but intergroup conflict was pervasive enough to be a major stimulus to cooperation.

Cooperation is a common feature of biological life. But humans carry social cognition to a highly sophisticated level, developing the ability to imagine others' viewpoints. This enables them to visualize possible futures and even imagine the attitudes of ancestors or gods. The repertoire of strategic behaviors—surprise, maneuver, and deception-- all require being able to do what the other side does not anticipate, which requires the ability to see things from other people's viewpoints and understand what they believe. Though we are imperfect judges of others' viewpoints, particularly when they belong to different cultural groups, in so far as people are able to do so, it confers huge advantages.

War drove cultural development by reinforcing our tendency to cooperate in groups against outsiders. Technological advances complicate the logic of evolved strategy since with sophisticated weapons the advantage enjoyed by larger forces in primitive conflict can be offset. Nevertheless, Payne finds that widely different societies with different technologies, social

relationships, and strategic challenges show similar psychological qualities, producing an

This is the author manuscript accepted for publication and has undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process, which may lead to differences between this version and the [Version of Record](#). Please cite this article as [doi: 10.1111/pops.12597](https://doi.org/10.1111/pops.12597)

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impressive continuity in strategy throughout history. This continuity persisted even with the rise of nuclear warfare because defense via the threat of punishment is inescapably psychological. Like all previous strategy, nuclear deterrence requires a careful appraisal of the antagonist's motivations.

Payne argues convincingly that war plays a major role in driving evolution. My own interpretation argues that cultural evolution proceeds by finding effective survival strategies in a given environment-- and that not only war, but starvation, disease and other forms of violence are the main obstacles to survival. Although this emphasizes a broader set of challenges than war alone, war is arguably the most powerful stimulant to evolution. Prior to the emergence of modern technology, there was not much one could do to increase the food supply or ward off disease— but violence was a daily threat to survival and people must have responded to it continually. Once we had devised weapons that can kill at a distance, animal predators no longer posed much of a threat— violence from other humans became the strongest immediate threat to survival. Once war emerged, it undoubtedly was a major stimulus to evolution.

In the final section of his book, Payne argues that Artificial Intelligence will radically transform the nature of war by changing the psychological basis of decision-making. Artificial Intelligence departs radically from the biological basis of human intelligence. It will dramatically speed up decision making, using very different cognitive processes in deciding when to launch an attack, or escalate violence. Artificial Intelligence will change the essence of strategy, the organization of armed forces, and the international order.

Moreover, unlike human actors, Artificial Intelligence systems will not be affected by the psychological factors that seem to limit the advantages of attacking forces in favor of the defense since, unlike humans, Artificial Intelligence will not depend on the emotional cohesion that emerges when a country is invaded. Thus, in 1940 when Finland was attacked by the USSR, the Finns fought back with such amazing determination that it convinced Hitler that the Soviet Union would be a weak foe. But when Germany invaded the USSR, the Russians defended their country with heroic determination. Payne argues convincingly that Artificial Intelligence will challenge some fundamental tenets of strategy—including the importance of mass, the dominance of the defense, the utility of surprise, the efficacy of preventive warfare, and the link between a society's values and the way in which it approaches strategy.

This could lead to both strongly positive and strongly negative possible outcomes. Let's briefly speculate on them. On the positive side, it seems possible that Artificial Intelligence will make war less likely or even abolish it completely, because war between major powers has become objectively irrational. Preindustrial societies have a zero-sum economy. Prior to the emergence of industrial society, land was virtually the only means of production and it exists in finite supply. You can only get more by taking it away from someone else. Since land provides their means of survival, this usually requires killing or enslaving them. When there is barely enough pasture or farm land to support your tribe, if another tribe comes along, survival may be literally a choice between Us and Them: xenophobia is realistic under these conditions and humans have evolved to respond xenophobically when survival is uncertain.

Industrialization changes the cost-benefit calculus of war. In industrial society, survival is no longer a zero-sum game. Industrialization increased productivity tenfold and then one hundred-fold, making it possible to become rich without conquering another country, killing the population and taking their land.

But psychological reality lagged behind the new economic reality because culture changes slowly. As recently as the 1930s, both Germany and Japan were governed by leaders who were convinced that the only way for their countries to prosper was to conquer large land empires. Japan set out to conquer China and Hitler planned to depopulate much of Poland and Russia, replacing Slav farmers with German peasants. World War II resulted and it was a catastrophe that devastated not only the conquered countries, but reduced both Germany and Japan to rubble. Ironically, stripped of their empires and reduced in size, both Germany and Japan re-industrialized after World War II and became vastly richer than they had ever been at the height of their empire. For getting rich by internal development had become much more profitable—and much safer-- than war.

The emergence of knowledge society greatly strengthens this tendency. Bill Gates became a billionaire before he was 40, Mark Zuckerberg became a billionaire before he was 30 and Jeff Bezos became the world's richest man, not by seizing someone else's land, but by developing knowledge-based enterprises. International competition continues but increasingly, it centers on the development of knowledge, rather than war. In 1909, Angell predicted the end of war between European powers because it had become economically irrational. But the two world wars that followed, discredited the claim that development and trade would make war

obsolete. Decades later, the enduring peace that has existed among major powers since 1945, has led a new generation of scholars to reconsider this seemingly-disproven idea. Unless they are intentionally programmed in, Artificial Intelligence will not be influenced by the xenophobic reflexes that humans developed during the pre-industrial era. As Artificial Intelligence takes on a leading role, war could become unlikely.

On the negative side, we face a growing long-term danger-- that Artificial Intelligence will take over from us. Payne plays down the speed with which AI is evolving, eschewing “the malign, anthropomorphized versions of AI that populate alarmist science fiction and journalistic accounts.” He acknowledges that the onset of more advanced forms of Artificial Intelligence might eventually generate internal motivations of its own, but he assigns this possibility to a remote future and gives it little attention.

So did I.

In writing the final chapter of my recent book *Cultural Evolution* (“The Coming of Artificial Intelligence Society”), I learned enough to become deeply concerned about the long-term consequences of rapidly-developing artificial intelligence. I didn’t want the book to look like science fiction, so I didn’t discuss this in any detail and stuck to analyzing immediate problems for which a massive empirical base of statistical evidence and survey data are available-- emphasizing the need for effective government programs to offset the rapidly-increasing inequality that is inherent in knowledge societies.

But I became convinced that in the long run, the greatest danger is not from other humans, but from artificial intelligence. In 2011, IBM’s Watson computer system participated in a game of *Jeopardy* in which it *correctly* answered deliberately ambiguous questions in natural language that required it to interpret puns and literary and historical references—and defeated the top-ranked humans in doing so. In the eight years since then, Watson’s capabilities have been extended rapidly and are being used in many advanced fields such as medical diagnoses. It is no longer simply a question answering system but can now 'see', 'hear', 'read', 'talk', 'taste', 'interpret', 'learn' and 'recommend.' Artificial Intelligence is evolving at a rapidly accelerating rate. This means that the future will come much more quickly than past experience would lead one to expect. Artificial Intelligence is already writing its own programs in ways that go beyond anything that human programmers devised or understand; it seems to be only a question of *when* artificial intelligence will equal, and then greatly exceed, human intelligence. From that point

on, our fate will no longer be in our own hands. In the next few decades we need to draw on the best human minds from all over the world in order to meet the extremely challenging but not impossible goal of instilling a permanent pro-human bias into evolving forms of artificial intelligence. Instead, a number of competing programs are rapidly developing artificial intelligence's ability to deceive and destroy humans.

-- Ronald F. Inglehart, University of Michigan

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