Missouri State

SCHOOL of DEFENSE AND STRATEGIC STUDIES

Defense and Strategic Studies Online

Online Journal of the School of Defense & Strategic Studies

Reynolds College of Arts, Social Sciences and Humanities

No. 3 Spring 2025

Volume 1, Number 3

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Cybernetics and Comprehensive National Power: The Grand Strategy of China's "National Rejuvenation"

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Introduction

In colloquial English, to say that a particular problem is "complex" is simply to say that solving it would be "complicated." To someone familiar with Complex Systems Science, Cybernetics, or Information Theory, however, such phrasing can signify something altogether more interesting – namely, that the problem in question displays certain characteristics making it into a specific *type* of challenge, and that it may usefully be understood, and perhaps addressed, through the application of specialized knowledge from those fields.

More importantly, for present purposes, that phrasing might also have such specific and technical connotations for a war-planner or strategist in China's People's Liberation Army (PLA) – and even for a senior political leader in the Chinese Communist Party (CCP)[1] at work in the Zhongnanhai leadership compound in Beijing. This is because, as we explain in this paper, the rulers of People's Republic of China (PRC) have in recent decades sought to ground the basic architecture of their grand strategy in Complexity-informed analyses and policy interventions.

But what do we mean by Complexity? Well, the world of Complex Systems Science can hardly be described as anything other than enormously "complex" in its own right, and we will not pretend to do it justice here. By way of an elementary primer, however, it is worth remembering – as Scott Page has explained – that

> [c]omplex systems are collections of diverse, connected, interdependent entities whose behavior is determined by rules, which may adapt, but need not. ... A complex system consists of *diverse* entities that interact in a *network* or *contact structure*—a geographic space, a computer network, or a market. These entities' actions are *interdependent*—what one protein, ant, person, or nation does materially affects others.[2]

These relationships of interdependence between structural elements are fundamental, and help give rise to some of the most important aspects of a complex system:

> The interdependence between the constituent elements and sub-systems of a complex system can create powerful feedback loops, both positive (*i.e.*, self-reinforcing) and negative (*i.e.*, dampening), which often makes system behavior notoriously nonlinear. Combined with such systems' sensitivity to initial conditions—that is, the degree to which even only very slight differences in an initial starting point can result in enormously different outcomes—these dynamics can make the behavior of complex systems highly unpredictable over anything but almost trivially short timespans.[3]

Those who study such Complexity on major faculties and in places such as the Santa Fe Institute have used examination of such systems to develop remarkable insights in a range of fields – not just theoretically, but also in various applied contexts. As the primary concerns of the authors of this paper relate to U.S. national security policy, it is important to note that such contexts can include policymaking as well.

And indeed, just as some scholars have attempted to draw upon complexity analysis to provide insights useful for policymakers,[4] so too is the degree of the CCP's commitment to complexity-based approaches – and its effort to employ them in the governance of China – receiving increasing attention. Beyond a still-small group of intrepid Western scholars, however, the magnitude of this CCP commitment to Complexity-informed policymaking is not yet sufficiently understood. This paper thus seeks to provide further insight into the profound shift into the Complexity paradigm that occurred in the CCP leadership a generation ago, outlining how such concepts today provide the key to understanding how modern Chinese leaders seek to expand their country's national power and achieve its imagined destiny of geopolitical "return" or "rejuvenation" in the international arena.

The Power of Paradigm

In his celebrated 1962 masterwork, *The Structure of Scientific Revolutions*[5] – and even more directly in his 1969 Postscript to the Second Edition[6] – Thomas Kuhn brought his interpretation of the word "paradigm" into common use in his analysis of scientific progress and the communities that organize around the study of scientific phenomena. Paradigms for scientific communities constitute more than simply the common ground between participants in research circles. They also provide the understood baseline – "examples which include law, theory, application, and instrumentation together" – from which the community's members conduct and evaluate experiments,[7] activities he collectively labeled "puzzle solving." While Kuhn argued these accepted practices do not constitute "rules," within these communities, adherence to them is the starting point for a researcher's credibility.[8]

Kuhn's aim in this exploration was to articulate how a scientific community absorbs the results of experiments which call the community's "quasi-standard" theories into question, causing a crisis – a revolution – within the community. The received conceptual baseline be within a community can be so powerful that its members have a difficult time accepting (or even *seeing*) things inconsistent with

that baseline, as a result of which many members of such a community resist or reject revolutionary findings. This can make it difficult for genuinely new conceptualizations to take hold, and it is common for multiple paradigms to co-exist within communities for a time, as inconsistencies are hashed out and new theoretical constructs gain adherents.

Often, according to Kuhn, the replacement of an existing paradigm with a new one must await generational succession in the scientific community, for it is often a subsequent generation of scientific pathfinders who advance the new paradigm against older adherents of the previous conventional wisdom, until its explanatory power can no longer be resisted and the old paradigm finally fades.[9] During this period of divergence, the gap in understanding between the two communities grows, with each judging the other's work as increasingly nonsensical and their epistemologies gradually becoming mutually unintelligible.[10]

As non-scientists, we recognize the risk of invoking Kuhn in a discussion of CCP grand strategy, and do not assert that his framework of conceptual succession necessarily applies here in every respect. However, as will be detailed herein, we do believe that a paradigm shift in favor of cybernetics-informed, systems thinking-based approaches took hold among the CCP leadership in the aftermath of the death of Mao Zedong and the purge of the Gang of Four – a shift that in many ways represents very much the kind of succession Kuhn described – and that this shift resulted in the adoption of approaches grounded in what is generally known as the science of Complexity, which has only grown in influence within the Chinese strategic planning community and the central Party apparatus in the years since.

A New CCP Paradigm of Power

In their detailed examination of the ideological reckoning within the CCP during this period, *Chinese Marxism in Post-Mao China*, Bill Brugger and David Kelly insightfully analyzed a range of influences on party thinking, including special attention to Cybernetics, general

systems theory, futurist analysis, and applications of scientific concepts such as thermodynamics to control of complex giant systems even in the early stages of the era of Deng Xiaoping's "reform and opening up" (改革开放, *Gǎigé kāifàng*) in the mid- to late 1970s. Very much in line with Deng's direction to "seek truth in facts" – which was seen as a call to scientific objectivity and pragmatism – these conceptual approaches easily aligned with the CCP's prior interest in holistic social theory, dialectics, and materialism, making them a natural fit to guide the Party's post-Maoist agenda.[11]

It is not our intent in this paper to exhaustively document the incorporation of cybernetics and related theories concerned with instrumentation and control of complex macro-systems into Party-State national reform policy beginning in the late 1970's. In fact, Dylan Levi King already does a fine job of this in his 2024 essay *A Brief History of Chinese Cybernetics*.[12] While King is skeptical of the success these approaches have actually had as applied by the CCP, mostly in the context of domestic policy, we assert that complex adaptive systems thinking and cybernetic methodologies are dominant across the modern Chinese Party-State in nearly *all* aspects of CCP policy and strategy as it pursues "the great rejuvenation of the Chinese nation" (中华民族伟大复兴, *Zhōnghuámínzú Wěidà Fùxīng*) by the year 2049, which will mark 100 years since the establishment of the PRC.

Today, China-watchers outside the PRC encounter the lexicon of complex adaptive systems (CAS) ubiquitously in CCP and PRC government pronouncements, policy guidance documents, academic treatises, and strategic writings, from the highest level to the working level, in research and policy circles, across the full range of Party-State activity from national defense issues to economic, social, and political affairs. We agree with Dylan Levi King, who began a presentation to the Cybernetics Society by asserting "it's nearly impossible to understand the logic of Chinese politics, the function of Chinese politics, without understanding Cybernetics … and a distinct Chinese Cybernetics tradition"[13] – but we would extend this dictum beyond mere politics to encompass, as well, the entirety of Chinese grand strategy. Western leaders will greatly misunderstand Chinese policies, and hence may fail to devise adequate counterstrategies,

unless they grasp the centrality of these concepts to CCP leadership across the full breadth of public policy issues.

To wit, we believe an understanding of CAS and cybernetics must inform any analysis of the PRC's national strategy of "rejuvenation." To the uninitiated, official explanations of the strategic objective of this strategy can seem vague in publicly available sources, and Western readers may be tempted to treat CCP pronouncements about China's strategic future as airy and only partly meaningful rhetoric, full of jargon words that sound nice to the ear but cannot be pinned down with enough specificity to provide either real explanation or clear guidance.

With an understanding of the systems theory paradigm that drives CCP strategic planning, however, it is possible to open up a much deeper understanding of Chinese strategy, and to see such statements and writings as actually offering what is – and is *understood* by CCP audiences to be – a geopolitical policy agenda every bit as clear and strategically pointed as Complexity thinking would permit any such policy program to be. Through the prism of Complexity, in other words, rather than just representing vague and aspirational puffery, CCP writings display great rhetorical and thematic consistency, and can be seen to convey real information and guidance, both about the ends, ways, and means of Chinese grand strategy and about the relationships between them.

To take a simple example, in an October 2022 speech to the 20th National Congress, Xi Jinping declared that "[b]y the middle of the century, we must build China into a great modern socialist country that *leads the world* in terms of Comprehensive National Power and international influence."[14] On its face, such a statement – while certainly making clear the speaker's intention to see China expand its global role and stature – might seem largely empty of substantive content about what this really means and how it is to come to pass. In its CCP context and through the lens of the Party's now decades-long commitment to Complexity-based policy, however, it actually signals much more. In fact, one might expand the full meaning of Xi's shorthand statement, for instance, to read:

> By no later than 2049, the PRC will be the world's most powerful country in terms of "Comprehensive National Power" (CNP) [综合国力],[15] with the world's most effective national strategic systems and strategic capabilities, through which CNP is exercised in service to national sovereignty, development, and security interests as defined by the Communist Party of China, and for purposes both of positioning China as the central node in the open, complex, giant adaptive system of global affairs, and of positioning the Party as the dominant central note within that systemically dominant China.

Such an exegetical expansion is cumbersome, of course, and that is precisely why Chinese pronouncements seldom fill in such details. For their intended audiences within the Party-State system, however, they do not *need to*, for Chinese policymaking has been suffused for the last four decades by Complexity-based thinking. In context, shorthand locutions are generally all that is needed to direct the reader or listener to a range of antecedent understandings that represent the *new* conceptual baseline for the CCP's current paradigm for strategy and policy.

As we have presaged by our "decoding" of Xi's October 2022 speech, it will be our contention in this paper that:

1) The modern PRC Party-State's approach to governance at home and grand strategy in the world is best understood by first gaining an appreciation for the cybernetics and Complexity ("systems thinking") paradigm from which its engineers and architects – namely, CCP leadership, strategists, and officials at all levels – approach their work as part of a coherent national strategy.

2) Likewise, Comprehensive National Power (CNP) must be understood in terms of the central role it plays in both the shaping and the conduct of PRC national

strategy – namely, as the highly complex, interrelated network of factors that collectively constitute a country's strategic optionality relative to other actors within the international system, and the relative degree of possession of which determines nations' fate in the international arena. CNP – a complex and aggregative concept which itself both draws upon and influences CCP "systems thinking" – constitutes at once the metric for assessing progress in domestic Chinese development and the foundation for national strategy across all aspects of the global "competition between national systems" which the CCP intends both to *win* and to win in ways reminiscent of the decisive manner in which it feels superlative *British* and *American* CNP produced global dominance for those powers in generations past. In this fashion, CNP theory thus describes both China's return from the "humiliation" of having been overmatched by the barbarians' CNP and the path through which Beijing is reclaiming the systemic global centrality it assumes to be its birthright.

3) While Xi Jinping is often credited with ushering in changes in PRC strategy, as he has led the PRC during a time that has produced some of its most dramatic expansion in national power, Xi is in some sense merely the inheritor of an older tradition of attempting to bring about systemic Chinese modernization in search of national power that predates the CCP or even its predecessor, the Kuomintang (KMT). Importantly, while Xi is credited with ushering in important changes, these changes – and China's present-day global assertiveness – are the product of CNP-based assessments of China's degree of progress as "national rejuvenation" has augmented its power in the global arena.

   These assessments were made on the basis of general performance metrics the CCP began to develop in the

> early years of Deng Xiaoping, and they draw heavily upon the work of early PRC pioneers in cybernetics. Xi's strategic moves are thus both new and yet not truly novel: they are the result of conclusions reached in the years before Xi rose to preeminence that China had reached a new historical position in which – after long years of strategic patience under Deng's rubric of "biding time and hiding capabilities" – it was now both possible and appropriate for the country to act in increasingly assertive ways that had in a general sense been anticipated all along, but that were previously inadvisable.

The two closely-entangled frameworks of CNP theory and the CCP's cybernetics-derived concepts of governance, therefore, provide the keys to understanding the interrelated ends, ways, and means of Chinese grand strategy over most of the last half century. They represent a powerful "through line" of conceptual continuity and strategic focus that ties essentially *all* facets of modern CCP policy together into a coherent whole.

A New Paradigm for Understanding Chinese Strategy

We believe, moreover, that understanding the CNP/systems paradigm shift that occurred in Chinese concepts of governance and power after Mao's death also points toward the need for a *second* paradigm shift: one in our own thinking *about* China. Through a Kuhnian prism, it seems to us that there is a divergence in understanding – a paradigmatic gap – within Western analyses of the PRC. Western observers of China have long struggled to make sense of CCP policy as it has evolved over the last few decades.

At present, the received wisdoms of Western interpretations of the post-Mao era seem to have been destabilized by events, but no clear *replacement* paradigm has yet taken root capable of persuasively and comprehensively describing the PRC's approach and the breadth of CCP policies. This destabilization of the conventional wisdom is not merely a problem for scholars, of course. It is particularly problematic

for policymakers responsible figuring out what to *do* in response to the challenges the PRC presents to the rest of the world.

As broadly outlined above, however, we think that an organizing framework for a deep understanding PRC grand strategy *can* be discerned, and that the CCP's last half-century of policymaking can be understood in ways that go beyond simply cataloguing a succession of disparate and idiosyncratic choices. Specifically, we would point Western China-watchers toward the "systems-thinking" approach that it is now clear that the CCP has adopted for itself. The *new* paradigm for Western China-watchers should be grounded in understanding Chinese grand strategy as that country's leaders *themselves* understand it – that is, through the prism of concepts and theories associated with Cybernetics, Systems Science, Complexity Science, Dynamic Systems Theory (Chaos Theory), and other related scientific approaches which have found purchase within the CCP's national strategy of "the great rejuvenation of the Chinese nation."

The authors of this paper certainly did not ourselves take the first steps on this journey, and it is important to highlight that important work has already been done to draw attention to the role of cybernetics (控制论, *kongzhi lun*) and systems thinking (系统思维,*xitong siwei*) in PRC planning and strategy. We cannot do full justice here to the pathbreaking China-watchers who have taken important steps to document CCP reforms along these lines as the Party-State has pursued policies and strategies of "systematization" or "institutionalization" (制度化, *zhiduhua*). Chad Sbragia, currently with the Institute for Defense Analyses, has done as much as any other Western scholar to advance understandings of the central role played by systems thinking in the CCP's strategic design.

Outstanding further work has also been led by scholars such as Samantha Hoffman,[16] Alex, Stone,[17] and Dylan Levi King,[18] as well as journalists such as *Wall Street Journal* reporters Josh Chin and Liza Lin.[19] Researchers at the RAND Corporation – Jeffrey Engstrom and others – also deserve recognition for their analysis of the embrace of systems thinking by China's People's Liberation Army (PLA) in thinking about modern warfare.[20] Despite their endeavors, however,

the systems-based approach to understanding Chinese grand strategy has yet really to take off among Western analysts.

It is past time for that to change. In this paper, we thus attempt to build upon prior work and to open the conceptual aperture further to achieve a fuller understanding of the sweep of PRC grand strategy. Herein, we will examine the ways in which complexity thinking in CCP strategy and policymaking is closely tied to the Party-State's formal adoption of CNP as the key intellectual framework for assessing progress toward national rejuvenation and global preeminence, and how CCP leaders have built their approach to strategic competition around these conceptualizations as they seek a future for China in the world that restores to it the power, wealth, and systemic centrality it feels itself to have lost since China's first fraught encounters with Western power and modernity in the early 19th Century. We also explore how understanding the connections between CNP and complexity thinking can help illuminate the *ends*, *ways*, and *means* of what we submit is a remarkably consistent and effective CCP approach to geopolitical grand strategy vis-à-vis the West over the last generation – an approach to strategy that must be understood if our own leaders are to mount an effective response.

Ends, Ways, and Means

Before going much further, however, it is worth saying a bit more about the ends/ways/means typology we employ here. There may be many specific ways to define these terms, but for purposes of this paper we treat "ends" as referring to the basic desired end state of national strategy – that is, the basic characteristics of the future world that Chinese strategists wish to bring into being and thereafter maintain over time, and toward which their policies are directed. We thus treat "ways" as referring to their vision of *how* the aforementioned ends are to be achieved: the basic mechanisms or processes through which the strategic environment will be brought into conformity with those ends. Finally, we treat "means" as referring to the specific techniques, resources, or levers of power that are to be wielded and coordinated in order to ensure that things evolve in the desired "ways" needed to produce the strategic "ends."

When framing their approach in ways relevant to such an ends/ways/means framework, CCP thinkers describe their approach as involving *ways* such as national development strategies within the Party Charter (*e.g.*, the Military-Civil Fusion Development Strategy[21] or the Innovation-Driven Development Strategy[22]) that are directed toward *means* such as the accumulation and control of the strategic resources that together constitute CNP. Efforts such as the foreign infrastructure projects of the "Belt and Road Initiative" (BRI)[23] can be viewed, in turn, as initiatives for *using* China's CNP in support of objectives – for instance, enmeshing smaller countries in relationships of dependence upon China – that themselves conduce to giving China *more* CNP.

As this mutually-reinforcing layering of anticipated effects suggests, CNP plays a special role in this CCP worldview, for CNP represents in some sense the ways, the means, *and* the ends for national strategy and global competition. Development of CNP is critical to providing resources for *further* developing CNP, and CNP is required to outcompete the West because possession of superlative CNP leads to – and is essentially inseparable from and synonymous with – global preeminence.

To CCP leaders, moreover, "systems" thinking is a mode of thought to some extent separate from and independent from *all* these ends, ways, and means, in the sense that it represents a way of viewing and operating in the world that suffuses their views of all the elements of strategy. Systems thinking thus simultaneously provides them with the methodologies, evaluative tools, performance metrics, and analytical frameworks with which to *approach* the leveraging of means and ways toward strategic ends.

Such system thinking also helps explain why Chinese officials do not feel their view of CNP to be circular. In effect, they believe that the purpose of having CNP is to generate more CNP, and that CNP is what one uses to bring this about. From a *systems perspective*, this statement is no more circular or otherwise logically problematic than the commonplace observation that network effects can create

self-reinforcing "success-to-the-successful" dynamics in which the centrality of a key node in the system tends to reinforce itself and to increase the degree to which that node dominates the network's topography.[24] (This is why, after all, there are hyperscale search engines on the Internet. The more nodes a search engine connects to, the more valuable it is as a search engine, thus encouraging even more nodes to connect to it.) In effect, CCP leaders aspire to set in motion and oversee a self-reinforcing system effect of this sort, to China's cascading advantage, in the realm of national power.

It is important to be able to understand the thinking of one's adversary – as, of course, the ancient Chinese strategist Sunzi urged one to do[25] – and we stress that this conceptual interpenetration of CNP and systems thinking is quite central to modern PRC strategy. Moreover, while we acknowledge that the more specific ends/ways/means typology we employ here is not the way things are usually described in Chinese writings, we nonetheless think it a useful way for outsiders to understand the ways in which CNP theory and systems thinking have shaped Beijing's policy.

To summarize briefly, it is our argument here that CCP grand strategy does not seek to maximize CNP for its own sake in the abstract, but rather because it views the possession of superlative CNP as *leading* to and being essentially *synonymous* with strategic circumstances of sweeping civilizational and world-systemic dominance. As will be detailed further herein, we regard such dominance itself as being the ultimate objective of PRC grand strategy, and accordingly view a Sinocentric global order as being the ultimate objective – the "ends" – of CCP grand strategy. (As noted, through this prism, the augmentation of CNP can be regarded as the *way* in which this objective is to come about, though it is also a requirement of the *end*, because CNP is the basis for dominance of the international system.) This objective of Sinocentric order – or, as a Chinese nationalist might see things, a *return* to the natural order of things after a century or two of derogations from such Sinocentrism – has been a remarkably constant Chinese goal over time, even in periods predating CCP rule.

Within this broad continuity of general strategic objectives, moreover, Chinese leaders have been remarkably consistent in their approach to *ways* and *means* as well, albeit with major shifts occurring both upon the Communists' seizure of power in 1949 and after the death of Mao Zedong in 1976. With regard to *means*, we will also argue, as suggested above, that one of the more noteworthy *means* the CCP envisions employing to achieve its strategic ends is the application of cybernetic theories to the pursuit of authoritarian social control, both domestically and abroad. As for *ways*, we believe the CCP has been consistent over the last few decades in its relentless focus upon the pursuit of CNP – a concept that can itself be understood as strongly influenced by the CCP's penchant for Complexity concepts.

Let us first turn to China's strategic *ends*, which we contend cannot be understood without remembering the rollercoaster of Beijing's challenging experience with the outside world over the last two centuries.

Successive Chinese Regimes, but One Direction

In a paper published nearly 20 years ago, one of the authors of this essay described the enormous psychic "shock" to Chinese sensibilities that occurred in the 19th Century when modern Western norms of (theoretically) coequal national sovereignties first collided – and then came increasingly into zero-sum conflict – with the ancient monist and hierarchical conceptions of Sinocentric political cosmology. In that paper, subsequently expanded into a book,[26] he contended that one important aspect of the Sino-European conflicts of the period was the fact that

> they were not just about trade or conquest but that they also represented a profound clash of intellectual paradigms. This period has a special significance precisely because it was one of status conflict, a struggle that was clearly understood as such on both sides, as the opposing worldviews of Sinic universalism and international pluralism ran headlong into each other. Neither

> competing conceptual system had any space in it for the other's views, for each denied the premises on which the other was founded. One might say that the world had become too small for both to coexist.

The Western imperialists of the 19th Century did not view large portions of the rest of the world as constituting properly rights-bearing Westphalian nations at all, of course, and duly proceeded to conquer and directly rule many such peoples in Sub-Saharan Africa, South Asia, North Africa, and elsewhere. Where nations *were* felt to exist elsewhere in the world, however, the European norms of the day insisted upon at least a notional juridical equality between them. And this was, initially, the case with China in its encounter with the West, as one of the authors has documented in recounting the early struggles between mid-19th Century British negotiators insisting upon the indicia of coequal sovereignty (*e.g.*, reciprocal terms of address and ceremonial formalities in negotiations, or official diplomatic representation in Beijing) and Qing Dynasty officials insisting upon indicia of European vassalage.[27]

The Europeans and Japanese, of course, soon got over such sovereigntist qualms as the degree of their military and economic overmatch vis-à-vis the Qing became apparent, and by the late 19th Century they felt perfectly comfortable imposing starkly asymmetric treaty terms upon China and seizing concessionary privileges that would have been difficult to defend if they had felt China to be a *fully* sovereign equal.[28] Even so, the initial clash of conceptual paradigms was striking, illustrating a deep incompatibility between China's ancient Sinocentric instincts and the requirements of Westphalian order that may have great relevance in the present day.[29]

Yet even the ideational confrontation of that period was also about much more than just that "shock of plural sovereignty," for the challenge to China's ancient political, moral, and ideational sensibilities and its sense of self-identity was all but existential. China was an empire that had become accustomed to viewing itself as the center of the human universe. In its own eyes, it was the most important and most worthy domain in the world, the pole star of

civilizational sophistication and merit, and the culture which all but *defined* humanity – and the culture toward which all civilized people turned in awestruck deference precisely to the degree that such lesser peoples were in fact civilized (and hence human) at all. This proud and arrogant old empire, however, suddenly found itself confronted by a brash civilizational "Other," in the form of a European world that – riding high on swelling tide of social, scientific, economic, political, and military advancement that had been created by the Scientific Revolution, the Enlightenment, and the First Industrial Revolution – now seemed to outclass the Celestial Kingdom in every imaginable way.

China's sense of full-spectrum civilizational overmatch by the Europeans – as well as the subsequent trauma of seeing the Chinese neighbor and supposed civilizational vassal state of Japan enthusiastically adopt Western modernity and then lord its resulting power over China[30] – was of surpassing importance. As one of the authors of this paper has put it,

> the comparison of the once-proud [Chinese] empire to this dynamic new outside force was, for China, emotionally devastating. Before long, even Chinese nationalists such as the seminal thinker Liang Qichao at beginning the 20th Century found themselves echoing what Tsar Nicholas I of Russia had said about the decaying Ottoman Empire – describing it as being the "sick man of Europe." Now, Liang said, proud China appeared to be "the sick man of Asia."
>
> Being thoroughly bested and outshone by such an adversary was new to China, and the psychic trauma of this encounter upon the Middle Kingdom's preening self-regard was so great that it still resonates powerfully today, albeit with a good deal encouragement by Chinese government propagandists, in pervasive rhetoric about China having suffered a "Century of Humiliation" at European and then Japanese hands.[31]

This sense of humiliating civilizational overmatch – and the desire to set things right once more – is what has helped provide Chinese grand strategy with a stiff spine of *ends*-based continuity ever since.

The "Great Telos of Return"

This 19th Century psychic trauma instilled what would be the *leitmotif* of multiple successive regimes – in effect, *every* successive regime – in China: the imperative of "return" by way of some kind of "national rejuvenation" that would right the humiliating wrongs of that 19th Century encounter and return China to its rightful place in the world. Much has changed in China and the world since then, but we submit that this theme has run powerfully through Chinese strategy and geopolitics ever since. One of the authors has elsewhere termed this China's "Great *Telos* of Return," which he describes as

> a powerful recurring theme in modern Chinese history, one through which actors of all stripes have tended to approach political and economic developments and in which they have grounded their arguments for or against various political programs[:] … the importance to Chinese of restoring China to its perceived lost glory, redeeming it after its catastrophic late nineteenth-century loss of status and prestige. … This "central nerve" of a longing to return China – viewed to some extend interchangeably as a civilization and as a nation, though the modern concept of territorial nationhood is not one that the Middle Kingdom would really have recognized or accepted – to greatness is an outgrowth of the terrible shock of China's encounters with Western power as these encounters were viewed through the prism of a virtuocratic Confucian theory inclined to see in any such failures not the contingency of mere material weakness but in fact the indicia of deep moral and spiritual failings.[32]

Eras of Sinocentric Longing

In the late 19th Century and into the 20th – at the nadir of China's weakness and civilizational self-confidence vis-à-vis the West, as the Qing Dynasty disintegrated and the country slipped into a period of warlordism and chaos – this desire for "return" could find little expression except in mere frustration. The seminal Chinese nationalist thinker Liang Qichao, for instance, saw the world in terms of an "international struggle for survival,"[33] worrying that the rise of American naval power in the Pacific would preclude China's ability to achieve its destiny. "[N]o country is in a better position to utilize the Pacific in order to hold sway over the world than China," he wrote, "[b]ut China is unable to become the master of the Pacific …."[34] For his part, the Nationalist political leader of the Kuomintang (KMT) Party Chiang Kai-shek (Jiang Jieshi) reportedly made an entry *every day* in his personal diary about how to "avenge humiliation" (*xuechi tiaoyue*).[35]

For many years, Chinese fiercely debated among themselves how to learn the secrets – and reap the demonstrable *power* – of European-style modernity, and whether it would even be *possible* to remain civilizationally "Chinese" while so doing. Could they return China to the center of the world order, as it were, without simply *becoming* ersatz Westerners? Or did the 19th Century's stark civilizational overmatch bespeak the eclipse of Sinic civilization, entirely and forever? It was a fraught time for Chinese chauvinists.

But things seemed less dire and much more hopeful to Mao Zedong once his Chinese Communists had won their civil war against Chiang's KMT and had seized power over all the Chinese Mainland. In Mao's description, given in his famous 1949 speech to the First Plenary Session of the Chinese People's Political Consultative Conference proclaiming the establishment of the PRC in September 1949, the CCP's revolution was a world-historical triumph:

> … [O]ur work will go down in the history of mankind, demonstrating that the Chinese people, comprising one quarter of humanity, have now stood up. The Chinese

> have always been a great, courageous[,] and industrious nation; it is only in modern times that they have fallen behind. … Ours will no longer be a nation subject to insult and humiliation. We have stood up.

Yet even Mao – at least to some degree, despite his own degree of saturation in traditional Chinese forms as a young man – adopted an at least partially *mimetic* vision of Chinese "return." After all, the upstanding Chinese nation of his imagination was not one founded primarily upon principles that were inherently *Chinese*, but rather saw itself as the perfect instantiation of the imported *Western* ideological system of Marxism-Leninism. Communist China, as Mao came to see it as he neared his cataclysmic split with his Soviet "big brother" in the late 1950s and into the early 1960s, was the natural and proper leader of the global socialist community and "Mao Zedong Thought" the final word to build on the foundations laid by Karl Marx, Vladimir Lenin, and Joseph Stalin. By the early 1960s, Mao (himself described as the "Great Helmsman" of the Communist world) had in his mind expelled his Soviet rivals from the socialist community entirely, first labeling Soviet leaders as "revisionists" and then concluding that the USSR was no less than a reactionary fascist dictatorship.

Just as the ancient quotation attributed to Confucius held that "[t]here are not two suns in the sky, nor two sovereigns over the people," so also *Maoist* Sinocentrism turned out to be quite traditionally hierarchical and monist. As C.P. Fitzgerald once noted in 1964, Mao and his henchmen thus offered the modern world simply a

> restatement in modern terms of the fundamental postulates of the old Chinese view of the world: that China was the centre of civilisation, the model which less advanced states and peoples should copy if they were to be accepted within the pale, and that the ruler of China was the expounder of orthodox doctrine that, after all and always, Chinese interpretations were the right ones; truth and right thinking must come from China and conform with Chinese thinking. …

> The Chinese view of the world has not fundamentally changed: it has been adjusted to take account of the modern world, but only so far as to permit China to occupy, still, the central place in the picture. To do this, it was necessary to accept from the West a new doctrine … [but] it was inevitable that Chinese Marxism should be found to be purer than that of Russia, that Mao should be hailed as the greater prophet, and that "some people" should be shown to be in error. There cannot be two suns in the sky.[36]

Beijing's ancient Sinocentrism and the political cosmology of the supremely virtuous Son of Heaven, in other words, was now being expressed in the grammar and syntax of Marxist dialectics. The objective of Mao and his CCP colleagues was to "lead the revolutionary consciousness of the whole world," and they "envisaged world revolution with China at the Center."[37]

> Mao's enthusiasm [was] for an ideal of revolutionary spiritual transformation at home that would make China such a shining illustration of socialist progress and rectitude that its example would in turn transform the world. It also helped highlight China's own imagined future as the *leader* of the world-system, for this – through quasi-Confucian eyes – was the obvious destiny of such a revolutionary pioneer and exemplar.[38]

The *ends* of China's restoration to human civilizational primacy thus had not changed, but the *ways* through which this strategic end-state would be achieved were now Marxist-Leninist – a *non*-Chinese ideological framework – and the *means* to be employed to this end revolved around the Communist transformation of China as a beacon to the world and a model for revolutionaries everywhere.

Deng Xiaoping and Modern Sinocentrism

All of which, one might say, worked fine until it didn't. After Mao's death, it was painfully clear to his successors – above all Deng Xiaoping – that his revolutionary enthusiasms had failed to produce China's longed-for politico-civilizational "return." Communist China in 1977 was not at all the civilizationally central colossus it had dreamed of becoming. Quite the contrary: it remained impoverished, enduringly backward vis-à-vis the world's other major powers, militarily unsophisticated, and an object of genuine admiration only for small groups of privileged Western campus radicals, radicalized Western celebrities, a number of American Black Power activists, and the occasional Third World guerrilla band. Indeed, the Maoist chaos of the Cultural Revolution had very nearly torn the country entirely apart. This, clearly was not *return*.

Accordingly, without taking his eyes off that ultimate objective – a trait that he CCP under Xi Jinping refers to as "[r]emain[ing] true to our original intention and keep[ing] our mission firmly in mind" (不忘初心、牢记使命)[39] – Deng decided to recalibrate *ways* and *means*. In terms of *ways*, the new vision was, in effect, not one of trying to create a superior version of Soviet Communism, but rather now of turning to Western capitalist economic models to provide an engine for the growth of Chinese strength, power, and – eventually – global status. Having seen what export-driven growth and industrialization was already doing for Japan and for the "Asian Tiger" economies of Hong Kong, South Korea, Singapore, and Taiwan by the late 1970s, Deng sought to model a new approach for *China* based upon such models. Moreover, as he himself put it when explaining his decision to visit the United States for the first time in 1979, "America's allies are all rich and strong, and if China wants to be rich and strong it needs America."[40]

None of this actually involved Western-style political liberalization, of course. Long before Xi Jinping's current focus upon security and control, it was Deng himself who gave the orders for the PLA to open fire on students and workers demonstrating in Tiananmen Square in June 1989. Nevertheless, the *ways* of "return" were now seen to pass through hybridizing state-capitalist market-

responsive economic organization with Leninist theories of authoritarian control by an elite "vanguard party" that acts on behalf of "the people." (This approach also involved strategic deception, carried out under Deng's mantra of "bide your time and hide your capabilities" [韬光养晦] in order to be able to "get something done"[41] – that is, Deng advised his countrymen not to signal to the outside world the degree of their global ambition until after China had built up its strength enough to be able to change to the international order in its favor while handling the backlash that would occur when other powers finally realized what China was up to.)

This much is well known and well understood. And indeed China's export-driven growth has been hugely successful in giving Beijing unprecedented wealth and power – as well as ensuring, as discussed in the inaugural issue of *DASSO*, that large portions of the world have become enmeshed in stark dependency relationships upon China. Less well understood in the West, however, are two further points:

- First, it is seldom appreciated the degree to which these *ways* of Chinese geopolitical return sought to replicate for Beijing, vis-à-vis the rest of the world, just the kind of civilizational overmatch that China had itself faced in its debilitating 19th Century encounter with the vibrant, turbocharged civilization of expansionist Europe – a full-spectrum dominance now conceptualized as resulting from Europe's accumulation and maintenance, in those years, of superlative CNP. (Much of this ambition is now signaled in Xi Jinping's launch of the Global Civilization Initiative.)

- Second, even *less* well understood – at least outside Chinese leadership circles, presumably – is the extent to which, in the Deng era and thereafter, the CCP has quite self-consciously drawn upon (and attempted to apply in both the *social* and *political* arenas) concepts of systems-theoretical control that originated in Western

> cybernetics theory. These approaches the critical *means* by which the *ways* of full-spectrum dominance are to be achieved in service of China's longstanding *ends* of what Xi Jinping terms "national rejuvenation."

The following pages will elaborate upon these important points.

The Cosmology of CNP

Let's begin with "Comprehensive National Power." CNP is a concept which first gained currency in CCP leadership and strategy circles under Deng Xiaoping in the early 1980s. CNP remains to this day the central framing for the CCP's pursuit of "national rejuvenation," and it is both the primary conceptual metric used to judge progress in that rejuvenation and the key to the CCP's understanding of China's place in an environment of global competition based upon and decided by comparative CNP.

A New Paradigm for the Party

Deng Xiaoping ordered the Chinese system in the early 1980s to begin to assess national security and national strength more comprehensively, launching a nearly three-decade examination of CNP across the Chinese academic system. Accordingly, the PRC's academic apparatus set about working to map the contours of what was felt to constitute CNP, how such power could be measured, how countries could be compared to each other against this yardstick, how China might utilize these understandings of CNP to allocate resources across its national development system, and how to utilize CNP to drive domestic and international strategic objectives.[42] Through the process of defining CNP broadly, a rough definition of CNP emerged which saw CNP as the combination of all powers and international influence possessed by a state for its survival and development, including material and ideational ethos, and even intellectual influence.

As CNP became a central tenet of the Chinese system's approach to rejuvenation and international competition, complexity and

systems engineering lessons from scientists such as Qian Xuesen – about whom more will be said below – shaped how the Chinese system approached the pursuit and application of CNP. Writing in 2006, Huang Shuofeng, a Senior Colonel at the Academy of Military Sciences from the early 1980s until his death in 2006, explained that CNP constitutes a "complex, dynamic large system, composed of many factors[,] that combines natural systems with artificial systems. It is an integral whole with various factors organically connected."[43] At the Academy of Military Sciences, Wu Chunqiu similarly explained in 1998 that the CNP system is analogous to the human body, in which the various organs are all indispensable, relying upon one another for survival and both interdependent and influencing each other.[44] Within CNP theory, this interdependence is clearly demonstrated in the mutual reliance between constituent elements of CNP, including the way science and technology – a key constituent element of CNP – drives economic strength and national defense strength, which Chinese scholars and CCP officials have identified as two other constituent "strength elements" of CNP.

Huang Shuofeng, a trained mathematician, led the process for developing mathematical formulae to measure and calculate CNP, which included the identification of the key "strength" elements of CNP – national defense, economic, science and technology, national resources, science and education, political power, and international influence – the weighted values of each, and a series of complex equations by which he believed one could calculate CNP.[45] Huang adopted a "comprehensive integration method" (综合集成) that combined qualitative and quantitative analysis, first developed by Qian Xuesen, to calculate CNP.[46] Although throughout the decades from 1984 through 2010 there were debates over the constituent strength elements of CNP, Huang's 2006 framework appears to have been widely adopted in the years thereafter.[47] In 2014 the PRC's National Bureau of Statistics took on the calculation of CNP as one of its "main tasks," and it publishes in its annual statistical yearbooks information about China's progress in developing CNP.[48]

The fruits of this effort provide the basic framework used in China to measure the national condition – *i.e.*, progress toward

national rejuvenation – and to assess China's comparative standing globally[49] From an actual policymaking perspective, this framework is designed to drive a scientific method used to guide resource allocation across Chinese systems in pursuit of that national rejuvenation. Chinese analysts and policymakers alike thus use CNP measures as the basis for national strategy and policy.

It is hard to overstate the importance of this thinking to Chinese leaders. This approach, for instance, appears to have been a driving force behind the launch of national development strategies in two separate phases, the first from 1996-2002 and the second from 2012-2017, in which changed Chinese assessments of the national condition led to the development of new development strategies to underpin Chinese pursuit of national rejuvenation.[50] Centered on the task of ensuring resources needed for the survival and development of the state, moreover, this framework derives directly from a decades-long examination of how China had become so weak as to suffer the indignities of European imperialist mistreatment in the "Century of Humiliation," and – in an analytical element CCP leaders added after 1991 – how, in pursuit of its ambitions, Beijing could avoid the imbalanced allocation of systemic resources that Chinese analysts believe led to the collapse of the Soviet Union.

Conceptual Currents

The CCP's pursuit of quantifiable metrics of national rejuvenation draws both upon scientific Marxism and upon the belief that countries are not simply bystanders to history, but rather can actively shape their destiny. This notion that a state can shape the future, and ultimately its own history over time, underpins CCP confidence in the inevitability of the "Two Major Trends" (两个大局) – that is, the trend of China's national rejuvenation and that of "Great Changes Unseen in a Century." Notably, both of these trends center on progress in the development of CNP, with China's rejuvenation resulting from its CNP growth, and the "Great Changes" resulting from the juxtaposition of this Chinese development with the *declining* CNP of the West in general, and of the United States in particular, thus bringing about a global power transition in China's favor.

This "Scientific Marxist" approach, theoretically, is designed to enable the Socialist state to actively shape history by taking charge of historical trends through measurable assessments of those trends and carefully-prepared policies to shape and drive them. Measuring Chinese progress towards rejuvenation, represented by expanding CNP, is thus critical to success in outcompeting the rest of the world, and it is assessed that all countries can be rank-ordered in terms of their CNP – a ranking that primarily reflects the degree to which their internal systems have succeeded (or failed) in using CNP metrics to drive the development of their own national power – with every state's power being measurable and evaluable (at least in broad terms) vis-à-vis that of every other, so that China's gradual progress toward national "return" can be tracked.[51]

Since at least as early as 2000, careful efforts to track CNP have shaped Chinese foreign and security strategy and policy. Such assessments also played a role in leading CCP leaders to conclude that the time was ripe to abandon Deng Xiaoping's exhortation to "bide your time and hide your capabilities" and begin to act more assertively in the world. As China had been becoming increasingly wealthy, powerful, and self-confident during the 1990s and early 2000s, Chinese analysts began to assess that the era of "biding time" was passing as China became powerful enough to no longer need to hide its power as Deng had instructed decades earlier.

In the 2008-12 time frame, Chinese assessments of CNP began to place China in the position of the second most powerful country in the world, and this "scientific" conclusion opened the door to a notable shift in Chinese foreign policy to correlate with these new assessments. At that time, Chinese foreign policy significantly shifted, leading to calls for a "new type of great power relations," and changed approaches to territorial disputes in the South China Sea, based on Chinese understanding of comparative power and the ways in which that should dictate Chinese foreign policy.[52]

Yan Xuetong, for instance – one of the preeminent international relations scholars in China and leader of the CNP study group at

Tsinghua University – declared in 2015 that China had grown so powerful that it could no longer hide its capabilities as Deng had instructed.[53] Indeed, Yan also explained that this development of CNP now *required* China to change its policy and strategy goals, noting that "goals and strategies that are consistent with national strength and technology will succeed …."[54]

Some Reservations

We do not argue, of course, that all these CCP calculations of comprehensive power are necessarily correct, and assessing the basis and value of their metrics as an empirical matter is beyond the scope of this paper. It also seems likely that there are at least some conceptual flaws in the scheme.

Under the "political strength" constituent element of CNP, for instance, the Party emphasizes the importance of the leadership's vision and ability to lead the country in a consistent and resolute direction: this factor is weighted strongly.[55] It is similarly assessed that the volatility (and occasional chaos) of Western political and economic systems are an inherent drag upon those countries' CNP. It is less clear, however, that these conclusions are entirely the result of objective scientific assessment, for they are precisely what leaders would surely *want* to hear and officials would be *expected* to say when working within authoritarian systems which ground their domestic legitimacy narrative upon claims to provide strong, steady, and successful governance by suppressing "disharmony" and preventing disorder.

More broadly, it is difficult to understand how Huang's meta-synthesis approach to calculating CNP can accurately and scientifically determine comparative national power. While many of the "harder" power elements of CNP, as outlined by Chinese scholars, have real, measurable variables (*e.g.*, GDP, percentage of global GDP growth, or manufacturing output), the reliance on "experts" groups for qualitative assessments of elements that do not seem quantifiable renders the entire calculus subject to potential bias and political pressures – especially within an authoritarian system in which the

expression of opinions contrary to Party dictates may entail professional and personal risk – that may reduce the accuracy of assessments.

In some regards, however, it may not matter *too* much whether Chinese calculations of CNP are precisely accurate, as long as they are broadly so. Because the power gap is assessed to be so significant between China and the *third* strongest country in the world, for instance, the precision of the math involved may not be that important in ascertaining relative measures of national power: unless the calculation were *hugely* wrong, its basic conclusion would remain sound. Additionally, CNP is designed to help measure *trends* – both domestically and globally – and in that respect the precision of the mathematics is in many cases relatively unimportant, given just how obvious some trends are. (Indeed, one hardly needs detailed metrics at all to know that that China has grown much more powerful today than it was 30 years ago.) Nor is there much sign that a lack of fine-grained precision prevents CNP from being of value in the allocation of national resources for domestic development towards the overall goal of Chinese "rejuvenation," which is primarily what CNP calculations are designed to inform.

The real concern for Chinese leadership should probably be less about whether the math is correct in its detail, but rather whether the basic framework is conceptually sound in the first place – that is, whether the basic measures identified as underpinning national power are actually correct. Is the quality of political leadership, for example, as decisive as the CCP assesses it to be? Are the designated sub-element measures of economic strength the right ones to be tracking in the 21st Century in order to understand economic strength? Are CCP assessments of talent as a national resource accurate to measuring comparative power in that arena, and its contribution to overall power? Such foundational questions are surely of much more importance for CCP leadership than the specific metrics chosen to evaluate these basic measures and the math used in such calculations, because errors in the former will lead to significant misallocation of the resources intended to enhance those variables much more rapidly than errors in the latter.

Finally, none of these variables are static, and what constitutes national power is felt to change over time. (The specific combination of attributes that gave Britain superlative CNP in the mid-19th Century is not the same as the one that permitted the United States its dominant global role in the 20th Century and the early years of the 21st, for example, but this in itself makes CNP neither incalculable nor unimportant.) The CNP calculus is intended to permit the CCP to adjust its allocation of resources over time in response to changing conditions in order to focus most effectively upon maximizing the elements of strength that constitute national power. This ability to monitor, evaluate, and adjust resource inputs over time is felt to be essential to success in achieving national rejuvenation and ultimately replacing the United States as a global hegemon.

And indeed, some indicators suggest the CCP is doing this fairly well, such as dramatic improvements in China's capacity for scientific and technological innovation that have transformed the PRC into a global leader in some key emerging technology fields such as electric batteries in cars. At the same time, other signs indicate that the CCP has experienced some difficulties in correctly assessing the needs of national rejuvenation – such as China's collapsing property market, which suggests that errors were made in assessing the value of fixed asset investment-led growth in national GDP. How well the country's leaders are able to adjust and learn from their experience in managing such dynamics remains to be seen, but they are confident that CNP theory is a powerful tool that will make their success much more likely.

Despite its possible flaws, CCP strategists clearly approach the idea of CNP – and pursue its relentless maximization – with deadly seriousness, for they believe that in terms of future geopolitical outcomes, essentially *everything* hangs thereupon. We need to take this earnestness seriously, for these theories are of enormous importance in CCP policymaking as China works to outcompete the West.

Ancient Resonances?

It is one of the central themes of this paper that that CNP theory is intimately tied together with systems thinking as it has been developing in China since the 1950s. To put CNP into an even deeper historical context, however, it may also be that the concept draws to some extent upon additional conceptual sources, two very ancient, and one much more recent.

The idea of CNP may draw some inspiration, for instance, from its consistency with certain ancient Chinese traditions. It has been suggested, for example, that CNP theory "originally stemmed from Chinese traditional military philosophy" dating to the Warring States period (c.475–221 B.C.E.).[56] (Perhaps, for instance, antecedents exist in the admonitions of the ancient military strategic Sun Bin not merely to cultivate military power but also to "make the state prosperous."[57]) One of the authors has suggested that the Chinese concept of comprehensive power

> also seems to draw upon ancient concepts of the "rectification of names," a notion reflecting the vertical ordering of Confucian society in which properly describing the relational status of members of that society helped create harmonious order by defining the relationships and roles expected of them.[58]

Accordingly, "[j]ust as the rectification of names purports to provide Confucianism with 'an ideal social order with 'everything in its place,'" so it could be said that CNP theory – and especially the idea that countries could be objectively *ranked* on the basis of their CNP – "seemed to provide a comforting summing up of precisely who fell where in the international environment" and hence what their respective privileges or obligations might therefore be. (One might call this, he suggested "the rectification of rank.")[59] In a sense, just as terminological rectification both structured the natural order of things in domestic society, so perhaps CNP theory helped order the international environment by explaining who was on top, who was not, and why.

Another way in which CNP theory might draw, at least indirectly, upon Chinese traditions also relates to Confucian ethics. In the Confucian tradition, the foundation of political power is virtue – defined in Confucian terms as centering around benevolence, righteousness, propriety, wisdom, and trustworthiness – and political authority is viewed almost as a natural *secretion* of the virtuous leader, with its reach corresponding directly to the extent of that virtue. Indeed, the *superlatively* virtuous man was destined to become the Emperor, the Son of Heaven exercising authority over the whole world: "All Under Heaven," or *Tianxia*.[60]

According to Confucius, if "the true king leads the way" by his example, "the people consent and voluntarily follow."[61] Political authority was the natural outgrowth of the qualities of the ruler:

> The ancients who wished to illustrate illustrious virtue throughout the kingdom, first ordered well their own States. Wishing to order well their States, they first regulated their families. Wishing to regulate their families, they first cultivated their persons. Wishing to cultivate their persons, they first rectified their hearts. Wishing to rectify their hearts, they first sought to be sincere in their thoughts. Wishing to be sincere in their thoughts, they first extended to the utmost their knowledge.[62]

Confucius clearly felt the creation of political authority around such virtue was essentially automatic: "He who exercises government by means of his virtue may be compared to the north polar star, which keeps it place and all the stars turn towards it."[63]

> In effect, so powerful is the example of a true prince that right order spontaneously self-assembles around him: he who understands *li* [proper Confucian ritual] and embodies its virtue "would find the government of a kingdom as easy as to look into his palm."[64]

It is in large part for this reason that in the Chinese tradition, Emperors – modern Communist ones not excluded – tend to lay extravagant, propagandistic claim to virtue, as well as to take enormous offense if accused of being (for instance) self-interested, venal, foolish, or malevolent. The offense of such accusations is keenly felt because the perceived legitimacy of their claim to power depends upon self-justificatory assertions of virtue, and the ruler who *lacks* such qualities cannot possess the "Mandate of Heaven" and hence has no right to rule.[65]

On its face, CNP as an objective and rational material calculation may seem far removed from these romanticized ideals of Confucian virtuocracy. Yet CNP theory's stress upon the vision and quality of a country's leadership, political might, and cultural strength resonate with some of the claims of Confucian morality. Just as the Confucian gentleman becomes the ruler by first ordering his heart and his family according to the appropriate rituals – and just as the supremely virtuous ruler naturally becomes the Son of Heaven and hence orders the whole kingdom and its surrounding realms around his person – so the country that acquires superlative CNP by ordering and developing itself in the right ways (CNP being, first and foremost a function of proper *domestic* development) will become the natural leader and norm-setter for the international system. And indeed, Xi Jinping himself expects that as China achieves its national rejuvenation, ideas from China "will become the shared beliefs and norms of conduct for the whole region."[66]

CNP maximization – and eventually CNP supremacy – is thus as conceptually and causally central to the CCP's strategic objective of national "return" to geopolitical centrality as Confucian virtue was to an Emperor's consolidation of authority over "All Under Heaven."

> … [I]n China's strategic vision, achieving "national rejuvenation" by restoring the country to the preeminent global position it feels itself to have "lost" during its "Century of Humiliation" requires that Beijing augment its comprehensive national power. Significantly, achieving rejuvenation in this sense will also flow naturally from the

> acquisition of a commanding position in CNP. Augmenting national power is thus critical, and Chinese thinkers have stressed the importance of – and have frequently tried to track in quantifiable terms – China making progress vis-à-vis other countries in a range of economic, military, technological, political, social, and even cultural arenas.[67]

This focus was reflected, for instance, in the CCP's 14th Five-Year Plan, which noted proudly that

> China's economic strength, S&T strength, comprehensive national strength, and the people's standard of living have jumped to a new level, grand historic achievements have been made in establishing a well-off society in an all-round way, new strides have been made toward the great rejuvenation of the Chinese nation (中华 民族伟大复兴), and socialist China stands in the East with a more majestic posture.[68]

Looking ahead, the 14th Five-Year Plan projected that "comprehensive national power will rise sharply" by 2035. Notably, this was said to entail not merely boosting economic strength, science and technology strength, total economic output, and per capita income, but also establishing China as "a cultural powerhouse (文化强国), an educational powerhouse (教育强国), a talent powerhouse (人才强国), [and] a sports powerhouse (体育强国)."[69] In this synergistic way – with various facets of Chinese power increasing hand-in-hand and in mutually-reinforcing ways, so that "[e]lements in the system are interrelated and interact with other elements, which makes it qualitatively different from the same element in isolation"[70] – China was declared in the 14th Five-Year Plan to be "[r]iding this momentum" in moving toward Xi Jinping's "second centennial objective"[71] of establishing China as a "rich, strong, democratic, civilized, harmonious, beautiful modernized socialist world power" (把我国建成富强民主文明和谐美丽的社会主义现代化强国)[72] by 2049, the centennial of the CCP's seizure of power in China.

Not for nothing, perhaps, does the lead translator for the Center for Security and Emerging Technology (CSET) at Georgetown University claim that the Chinese term rendered in English as "powerhouse" in the abovementioned quotation from the 14th Five-Year Plan – *qiángguó* (强国) – may also be translated as "superpower."[73] This may be idiosyncratic, because translations of Chinese texts more commonly use 强国 to mean only "strong country" and 超级大国 to mean "super power." Regardless of the specific phrasing, however, the basic syllogism of the Chinese strategic vision arguably remains clear: if you acquire enough CNP vis-à-vis everyone else, the world will arrange itself around you.

What Kind of World?

As for what a new system thereby oriented around *China* might look like once it acquired superlative CNP, Chinese officials talk about establishing an entirely novel model of international relations based upon "Chinese" principles. This will be, we are encouraged to believe, a new global operating system based upon a "new realm of international relations theory" that is grounded in Xi Jinping's theories of "major country diplomacy with Chinese characteristics"[74] – phrasing which signals the Party's conclusion that China has now become the equal or near-equal of the United States, even as its CNP continues to grow.

As CCP pronouncements make clear, moreover, the ultimate objective is an even deeper global reordering, which is described as leading to the creation of a future "community of common destiny for humanity" (人类 命运共同体).[75] This phrasing, apparently originally used by Xi's predecessor Hu Jintao to refer merely to describe China's regional relations, has been broadened under Xi Jinping into a truly *global* concept.[76] As Yang Jiechi put it in 2018 when serving as chairman of the CCP's Foreign Affairs Commission, "[b]uilding a community of common destiny for mankind is the overall goal of China's foreign affairs work in the new era."[77]

Such an emphasis, of course, begs the question of what this "community of common destiny for mankind" is that China seeks to create. CCP officials, however, have not failed to provide an answer. According to Yang Jiechi, the purpose of the "community of common destiny for mankind" is nothing less than to "create a good external environment for the realization of the 'two hundred years' goal and the realization of the Chinese dream of the great rejuvenation of the Chinese nation."[78] This seeming circularity is no accident: the purpose of Chinese policy – that is, the ends toward which Chinese power is to be wielded – is to create a strategic environment conducive to Chinese power. The world, in other words, is to be reordered in order to support and perpetuate China's dominance therein.

This sweepingly Sinocentric vision brings us to the more *recent* conceptual inspiration for CNP: the proud but sclerotic Qing Dynasty's traumatic 19th Century experience of full-spectrum overmatch by a European civilization that was then enjoying an extraordinary flush of economic dynamism, military sophistication, political dominance, technological supremacy, and cultural self-confidence. The shock of this overmatch has helped set the tone and direction of Chinese grand strategy ever since, focusing it upon the imperative of China figuring out how once again to enjoy *that* kind of full-spectrum dominance for itself.

It was not merely that the Westerners – and especially the British, for they had enjoyed "first-mover" status in the Industrial Revolution of the late 18th and early 19th Century – enjoyed significant specific advantages in wealth and power. It was also that the *aggregation* of European advantages in almost every arena produced a sort of multiplier effect, even to the point of seeming to have profound moral and spiritual implications. Whereas China had for thousands of years assumed that its own multiple advantages vis-à-vis its smaller and more "primitive" (*i.e.*, less Sinicized) neighbors implied the existence of a moral gradient of civilizational hierarchy in which all other peoples were natural vassals whose role was to turn toward the Middle Kingdom in awestruck deference and emulation, it now felt as if European modernity had hijacked the model.

One of the characteristics of Europe's explosion onto the global stage in this era was the striking degree to which political elites in the rest of the world to some degree *internalized* the narrative that those European states represented the pinnacle of human civilization. This was certainly what the Europeans came to believe of themselves, of course, viewing their own civilization as the epitome of cutting-edge modernity in an era that had come to valorize linear rather than cyclic notions of societal progress, and seeing it to some extent as their world-historical mission to evangelize and spread that modernity to benighted foreign peoples. Yet so dramatic was Europe's ascent, and so great its seeming overmatch in those years vis-à-vis those they encountered abroad, that many of those foreigners came to half-believe such narratives themselves.

As Ayşe Zarakol has suggested, this proved particularly challenging for states (such as China) that "pre-date the Westphalian system as political entities."

> As empires, they long sustained social universes capable of producing comprehensive worldviews – in other words, before their incorporation into the Westphalian system these states had their own normative standards by which they defined themselves as "normal" and others as different, abnormal, or inferior.
>
> … Their incorporation into the Westphalian system in the case of these pre-modern empires necessitated giving up a self-affirming position of relative privilege and accepting a self-negating position of an outsider instead. This new position did not square well with self-understandings shaped by centuries of being the masters of their own domains. Furthermore, because they joined the original incarnation of the international system, the European society of states, as autonomous entities, their position of inferiority was not overtly forced on them, as it was in the case of colonized peoples – they came to an awareness about their inferiority, *i.e.*, in the sense of a lack or deficit of modernity, through their own internal discussions.

> … [The] people of these states did not reject outright the values of modernity as a hostile foreign imposition (as is perhaps the case with certain schools of Muslim thought) but, rather, looked upon those values as something to be emulated; believed Westernization to be a goal that a state could achieve by trying hard enough, and saw it as a solution that might allow them to recreate their past privileged position in the new normative universe.[79]

Zarakol's work focuses upon Turkey, Japan, and Russia, but China also offers a powerful example of these dynamics. There too, it was not merely that the Europeans *claimed* superior civilizational virtue for themselves in those years, but also that many of those in "less developed" regions of the world such as China were in those days strongly tempted to *believe it* – either simply *accepting* the implication that their societies and cultures were in some sense inferior, or at least being grieved and frustrated by their countries' inability fully to seize the world-historical opportunity of modern development. As Zhitian Luo has recounted, in China's fateful 19th Century encounter with Western power,

> the West was extremely successful in the struggle for cultural control, and this gradually changed the thinking of many educated Chinese. … With the foundations of their own culture thus undermined, Chinese attitudes towards it underwent a dramatic transformation. Chinese people now came to view their culture as barbarous, occupying a marginal position in the world. By the early 20th century China had lost its centre of gravity.[80]

The cognitive dissonance of having such *half-belief* in one's own unworthiness[81] rub up against memories of past grandeur and prior assumptions civilizational greatness – a tension made all the more combustible when accompanied by the social, demographic, and economic changes and dislocations associated with incorporation into a European-led global economy – helped create powerful "love/hate"

(or perhaps "emulation/repulsion") dynamics vis-à-vis Western modernity.

In the waning years of the Qing Dynasty and into the early 20th Century, Chinese furiously debated what their encounter with Western modernity meant for China. There was, on the whole, a general disinclination to *totally* jettison China's inherited culture in an attempt to reach the heights of Western-style modernity, in effect, *as Westerners*. As Deborah Welch Larson and Alexei Shevchenko have noted, "China's presumption of its innate cultural superiority to the West encouraged Confucian elites to resist Western technology," because "accepting Western science and education would have been an admission that Chinese morals and philosophy were lacking."[82]

Yet just *how* China was to learn from Western progress while remaining in some sense "Chinese" was less clear. Some felt it might be possible to pick and choose, successfully adopting *aspects* of Western modernity wherever they were useful, and adapting them for Chinese purposes. Others, such as the "National Essence Movement" of the 1920s and 1930s, wanted to restore Confucianism, take refuge in an assumed Chinese national character, and in fact use "'the Chinese way' to rectify Western civilization." For their part, Mao's Communists responded to the identity dilemma of modernity with a "messianic historicism" – a chiliastic or millenarian approach to social progress, taking refuge in Marxist-derived ideas of transformative revolution.[83] One way or the other, however, their traditional "belief in their cultural superiority shaken and undermined, the Chinese began a long and agonized search for a new sense of identity."[84] This search, moreover, was characterized by a sense of "deep longing … for respect and international status after their encounters with the West."[85]

With regard to the *ends* of Chinese strategy, the ontological insecurity that the Middle Kingdom developed in the 19th Century left a powerful feeling of humiliation in Chinese nationalist minds, this period being remembered thereafter as China's "Century of Humiliation."[86] This feeling has in turn helped make *rectifying* that humiliation – specifically, by restoring China's ancient relative degree

of status and grandeur in the world – the centerpiece of Beijing's strategic agenda.

With regard to the *ways* and *means* of Chinese grand strategy, this experience left two additional important legacies that may have directly influenced CCP leaders' susceptibility to and interest in CNP theory.

- First, it seemed to suggest lessons about how the accumulation and aggregation of multiple areas of relative advantage could produce world-reshaping power. The Europeans clearly enjoyed a dominant position over the Qing in economic dynamism, military power, science and technology, medicine, politics, and culture – all at the same time – and occupied the leading edge of scientific and technological advancement. These advantages let the imperialists reorder the entire 19th Century world around themselves. This lesson has been a powerful spur to CNP thinking, giving Chinese strategists powerful reasons to seek just such an aggregation of relative advantage for themselves on the basis of advancements in many of the same interlocking constituent elements of CNP that were felt to have given those Europeans their own edge over China – and indeed the rest of the world – two centuries ago.

- Second, it left Chinese nationalists with a strong impression of *what China's "return" would need to feel like* if such humiliation were to be truly rectified by the accumulation of such aggregated power. Specifically, it encouraged them to desire a reversal of that 19th Century overmatch on Beijing's terms, so that it would come to be the *rest* of the world that would feel overawed and inadequate in the face of *China's* unquestioned status as the epitome of cutting-edge modern power, prosperity, and sophistication. In a modernized version of how China's awestruck ancient vassal states were assumed to have looked at her, and

> of how so many of the anguished subjects of the declining Qing imperium came to look at 19th Century Europe, so too should the West eventually come to internalize its own civilizational inferiority to China once the latter's accumulation of overall, full-spectrum national power had been achieved.

This helps explain why, for instance, contemporary PRC propaganda relies not just on offering accounts of Chinese geopolitical benevolence and rectitude as a "replacement narrative" for all other accounts of Beijing's behavior,[87] but at the same time also – in ways that in this latter respect mirror Russian messaging – upon messaging intended to undermine and destabilize both the West's self-confidence in its own values, culture, and approaches to governance and any belief in the Global South that there might be anything in Western values worth admiring or emulating. Chinese military thinkers refer to this as "cutt[ing] off the enemy's 'heart support,'"[88] but it was perhaps expressed better by the British-Nigerian novelist Ben Okri, who wrote that "[t]o poison a nation, poison its stories."[89] The point is not just for China to be "the best," but also to ensure that others understand themselves to be unworthy by comparison.

Such narrative warfare is part of what the Communist Party refers to as having "discourse power" (话语权), which in his 20th Party Congress speech Xi Jinping instructed his countrymen to pursue by building "an international discourse power that matches our country's comprehensive national power."[90] As Xi explained elsewhere, China must "tell Chinese stories well, spread China's voice, and explain Chinese characteristics well."[91] This was reiterated at the Third Plenary Session of the 20th Party Congress in July, 2024, where the Plenary "Decision" called for China to "build a more effective international communication system" by "accelerating the construction of Chinese discourse and Chinese narrative system" to "comprehensively improve the effectiveness of international communication."[92]

The CCP's focus upon such messaging reflects the conclusion that discourse power is important to a country's CNP, for it constitutes a sort of "transmission belt" that helps turn CNP into international influence. Accordingly, the possession of discourse power is seen as critical to China making its own political, social, and cultural narratives the dominant ones of the international system. In some regards, in fact, the Party's emphasis upon discourse power reflects frustration that China's accrual of advantage in so many *other* facets of CNP did not automatically result in greater global acquiescence and deference to China.

To remedy this – and in ways consistent with the aspiration of CNP theory to permit Chinese leaders to adjust resource allocations in response to evolving conditions – the Party has directed considerable energy to promoting China's discourse power vis-à-vis its international (and primarily Western) competitors. Xi Jinping has explained, for instance, that "due to the long-term 'cultural hegemony' (文化霸权) and propaganda of the West, there are too many distorted interpretations, blocked truths, and inverted facts in contemporary Chinese values, and that China must work hard to 'let the world hear China's voice.'"[93]

Yet – as any good systems thinker might be inclined to expect – Chinese strategists also see discourse power as existing in a relationship of reciprocal influence with other elements of national power, both contributing to and also flowing from a country's accumulation of CNP. Chinese writers, for example, have said that the West's discourse power acquired its potency because of Western advantages in CNP,[94] and they expect that *any* country acquiring enough CNP will be rewarded – among other things – with discourse dominance.

The Chinese term "discourse power" (话语权, *huàyǔ quán*) – which is sometimes also translated as "the right to speak" – is closely associated with the CCP' ambition to "tell China's story well" (讲好中国故事). It "appears frequently in discussions surrounding technology, the internet, and academia," especially where "the Internet is framed

as a crucial space to establish global opinion in which nations compete for 'discourse power.'"[95] According to a 2010 article in the CCP flagship newspaper *People's Daily* by Lu Wei, who was then Vice-Director of *Xinhua News Agency* but "would go on to be Minister of the Beijing Propaganda Department and head the Cyberspace Administration of China,"[96]

> National discourse power is the influence of a country's "speech" in the world. It can be divided into political discourse power, economic discourse power, cultural discourse power, military discourse power, foreign affairs discourse power, public opinion discourse power, etc. Against the background of economic globalization, economic discourse power decides a country's influence, financial discourse power lies at its strength, and it includes both levels of collection power and communication power. Collection power refers to whether or not one is able to collect information from all areas in the world in real time, according to a country's needs, especially where this concerns financial market information. The more timely and complete this can be collected, the stronger collection power is, and the larger communication power becomes. Collection power decides communication power, communication power decides influence, and influence decides soft power.[97]

This is thus yet another example of how the myriad facets of national power are seen to exist in potentially powerfully self-reinforcing ways, with power framed here – as in so many other ways – through a system-of-systems conception.

All this, then, provides a deep conceptual foundation for a CCP policy agenda focused upon figuring out how to engineer superlatively aggregated power *for China* analogous to that CNP overmatch enjoyed by the Europeans during the Qing's 19th Century traumas of civilizational "humiliation," and which will thus allow China fulfil its destiny of occupying once again a position of systemically transformative centrality vis-à-vis the rest of the world.

With deep roots in such powerful national experience, CNP theory holds great emotive power for CCP thinkers, and has clearly been a central element of Chinese grand strategy in the modern era. From the days of Deng Xiaoping to the present, China has chased a dream of returning to the civilizational and geopolitical centrality it enjoyed of old, and it has assumed that "geopolitical centrality flows from the possession of superlative CNP."

Complexity and CNP

Concepts based in Complexity Theory also help explain why CCP officials are so attracted to understanding power in "comprehensive" ways. After all, if one thinks of human society as a huge complex system – or, more specifically, a complex *adaptive* system, in which the numerous entities constituting the system individually adjust their behavior in reaction to their environment on an ongoing basis[98] – it is all but impossible to see whatever might count as "power" in that system in any way that *doesn't* take into account the ways in which nonlinearity and feedback loops often make it possible for actions and effects in one corner of the system to affect events in another, perhaps unpredictably.

If any element of the system can, in principle, somehow affect any other element – and in potentially nonlinear ways – then there is no way to view "power" as being anything other than multidimensional, aggregative, and nonreductive. The mathematician and CNP pioneer Huang Shuofeng, for example, seems clearly to have seen things this way, explaining that "comprehensive national power is a comprehensive concept, which is manifested in a large non-linear (非线性) dynamic system composed of many elements."[99] Complexity thinking, therefore, highlights the assumed *comprehensiveness* of power.

Complexity thinking may also offer insight into how CCP officials believe – implicitly or explicitly – that "comprehensive national power" actually works in producing real-world geopolitical

benefits for is possessors. To understand this, it is necessary to take a quick excursion into network theory.

As Henry Farrell and Abraham Newman have observed, the topography of any given international network can play a powerful role in giving an individual state the ability to "weaponize" that network for strategic advantage – such as in gaining informational benefits ("panopticon effects") from the surveillance of major nodes over which it has jurisdiction, or in manipulating other actors' access to nodes upon which those actors depend ("chokepoint effects").[100] In cases of extreme "hub-and-spoke" topographic dominance, such as the U.S. position in the global financial system that has made economic sanctions such as those implemented by the Treasury Department's Office of Foreign Assets Control (OFAC) into the "go-to" tools of modern American foreign policy,[101] a country's "weaponization" of such a network position can become a powerful coercive tool.

Farrell and Newman focus upon extreme cases, for it is in hypertrophic examples of "hub-and-spoke" network domination that the "weaponization" dynamics they describe are most obvious and most powerful. Yet as one of the authors of this paper has observed,

> "weaponized interdependence" probably can be usefully thought about as a question less of kind than of degree. … Thinking of "weaponized interdependence" as a question of degree rather than of kind suggests the potential that actors may be able – as a matter of national policy – to intentionally both (1) *create or accentuate* advantages within any given network of relationships, and to (2) *develop and hone* the institutional capacities needed to exploit such asymmetries for strategic advantage, even as they seek to (3) *undermine* their competitors' efforts to do such things.[102]

And today, there indeed exists a growing body of qualitative analysis suggesting that China is seeking to create just such advantages for itself by systematically seeking to develop "leverage webs" that may thereafter be used for political and strategic advantage.[103] The previous issue of *DASSO*, moreover, also offered a

quantitative analysis of the dependency relationships China has built vis-à-vis many smaller countries, which may help corroborate the suspicion that these dependencies are not simply happenstance but rather the result of a deliberate strategy of pursuing ties in which increases in relational "bandwidth" provide maximal payoff in making China's international counterparties ever more dependent upon it.[104] (Nor would we argue that these effects are limited merely to small countries; it is merely that these effects are most pronounced and most obvious there – and thus most conductive to quantitative study.) Such manipulable dependencies clearly represent a much more general challenge.

Nor is such a conclusion, furthermore, at all inconsistent with what Chinese leaders have been describing themselves as doing. Xi Jinping, for instance, has spoken of the CCP's economic philosophy of "dual circulation" as offering China "a new development paradigm."[105] This idea of dual circulation aspires to shift the country from a primarily export-driven economic model toward one in which China's domestic market becomes the primary driver, even while Beijing remains able to "draw[] on the international economy through exports, critical supply chains, and limited imports of capital."[106]

Dual circulation is intended, first and foremost, to support CCP domestic economic development, aiming to address weaknesses in domestic consumption and hence presumably conduce to greater CNP as a result of improved economic balance and resilience. Nevertheless, it also has profound implications for dependency analysis, for it is a plan under which, in effect,

> the CCP hopes to *minimize* China's dependence upon foreign trade (by expanding domestic demand) while still *maximizing* the dependence of the rest of the world upon Chinese manufactures. If this 'dual circulation' plan succeeds, it would ensure both that the terms of such relationships can always be managed to Beijing's advantage and—quite explicitly—it would give China leverage over its trading partners that can be used more broadly, "in international ... competition."[107]

Trying to cultivate as many dependency relationships as possible upon China – and as many different *types* and with as many different *partners* – has clear relevance to "comprehensiveness" in national power, of course. With metrics such as trade volume, percentage share of global manufacturing, number of trading partners, and percentage value added in manufacturing supply chains all being believed to be part of the overall calculation of CNP, such relationships may directly result in improved Chinese CNP. They also have the highly desirable second-order effect of being *manipulable* by China precisely to the degree that Beijing's smaller partners become asymmetrically dependent.

Even beyond this, appreciation for the potential role of feedback loops and nonlinear effects in a complex system may also encourage Chinese strategists to believe that the accumulation of dependency relationships can provide power advantages not only arithmetically, as it were, but also geometrically. That is, such accumulation may be felt desirable not merely because each new dependency relationship will add its own discrete quantum of power advantage to a country's total, but also because such multifarious different "facets" of power are felt likely to *reinforce* each other, thereby creating net power benefits beyond simply the sum of their individual contributions. (As noted earlier, complex adaptive systems can sometimes display self-accelerating "success-to-the-successful" dynamics.)

Such conclusions about the power of *comprehensiveness* may also have been reinforced by painful memories of what it was like, as we have seen, for China to encounter the many mutually-reinforcing military, economic, technological, scientific, medical, political, and cultural advantages that 19th Century Europeans in their exuberant and world-transformative modernity seemed to enjoy over the "Sick Man of Asia." For centuries, after all, Chinese had cultivated an inherently imperialist vision of their own civilizational superiority. In traditional Confucian thinking, the non-Sinicized world was inherently barbarous, and humans existed in moral gradients, "from a civilized core out to an essentially barbarous periphery."

> These gradations were not strictly geographic, however, but were instead related to a given population's degree of Sinicization—that is, the extent to which its members had imbibed Chinese culture, understood the Chinese language, and lived according to Confucian ethics. In traditional thinking, in fact, these gradients determined not merely the degree to which a people might be considered civilized, but also the degree to which they might be deemed human at all. The mark of full humanity was to live according to the precepts; to the degree that one did not do so, one was not fully human. At the uncivilized margin of the system, people were, in moral terms, no more virtuous or deserving than animals.[108]

Barbarous outsiders, however, who "'turned toward Chinese customs out of admiration' (*xiangmu huafeng*)" would naturally tend to "gravitate to the Middle Kingdom in recognition of China's superior culture" – and, "in the stock Chinese phrase, 'come to be ruled' (*laihua*)."[109] Chinese had even felt able to dismiss outsiders as civilizationally inferior even when those peoples were much more militarily powerful than China and had actually conquered and rule it – as indeed occurred with the Yuan Dynasty of the Mongols (1271-1368) and the Qing Dynasty of the Manchus (1644-1912). In Chinese eyes and elite propaganda, one could trust that eventually such conquering foreign brutes would inevitably be Sinicized, drawn in and transformed by the power of China's innate merit and sophistication.[110]

Yet not only did such Sinicization never happen with the European imperialists, but from a late 19th Century perspective their apparent superiority over China was far from monodimensional (*e.g.*, solely military). To the contrary, European advantages seemed pervasive, and the myriad elements of their power tended in various ways – both gross and subtle – to reinforce each other. The Europeans' national power, in other words, seemed impressively *comprehensive*. It seems to be this very multifaceted and self-reinforcing comprehensiveness that Chinese thinkers credit with having allowed

Western powers to reshape the entire global economic, political, military, and cultural world around themselves in the 19th Century.

Such a perspective may help explain why, for instance, as China attempts to ensure its "return," the CCP places such a strong emphasis not merely upon objectively measurable aspects of power – most obviously, economics, military might, and scientific prowess – but also upon more ephemeral variables such as cultural attractiveness, discourse power, and whether or not China is, in Xi Jinping's words, internationally "credible, lovable, and respectable."[111] Indeed, there is probably *no* articulable facet of potential national power that CCP strategists would deem inherently *unimportant*.[112]

Not just economic and military weakness but also perceived Chinese *cultural* weakness vis-à-vis the West has been a notable CCP insecurity for many years,[113] for instance, with President Hu Jintao telling the 17th National Party Congress in 2007 that "the international culture of the West is strong … [while] we are weak," and that China's "great rejuvenation" would "definitely" need to be "accompanied by the thriving of Chinese culture."[114] Cultural strength is a critical constituent element of CNP,[115] and one that also requires discourse power in order to impress those values upon the world. Xi Jinping's proclamation that "[w]e should increase Chinese soft power, give a good Chinese narrative, and better communicate China's message to the world," thus reflects the requirement for discourse power to promote and advance Chinese cultural strength and undermine the Western "values hegemony" that Xi ascribes to continued Western dominance globally.[116]

The CCP clearly hopes to advance its own values in the world in ways unprecedented since ancient times as it seeks to promote "socialist spiritual civilization" (社会主义精神 文明)[117] at home and make the country "a cultural powerhouse (文化强国)" (or "superpower") abroad.[118] But it is perhaps even more important to *break* the appeal of Western values, for these – and Western "discourse power" – are felt to stand in the way of China's rejuvenation.

The key "systems" insight for CNP is to see all such various facets of power as existing, as it were, within a complex system of interrelated and interacting elements. In systems thinking it is well understood that the precise inner dynamics and reciprocal causalities of a sufficiently large complex adaptive system may be inherently hard for any observer to follow, let alone predict or control in a direct way. The ways in which complexity science envisions the possibility of *accelerating* dynamics of network dominance, however, resonate powerfully with CCP thinkers painfully aware of how multiple aspects of advantage reinforced each other in giving the Europeans the ability to reshape the 19th Century world – and who seek just that kind of self-accelerating comprehensive power *for China* in the 21st. To help bring this to pass, Chinese leaders have invested heavily in drawing upon lessons from cybernetics.

Cybernetics as a *Means* of Power

As for the *means* by which Chinese strategists have intended to bring all this about, as they seek to manipulate both Chinese society and the international system for strategic advantage, CCP theorists have come to draw quite self-consciously upon notions of social control that are rooted in cybernetics theory. As was also briefly noted in a paper published in the inaugural issue of *DASSO*, the cybernetic legacy in CCP policymaking can be traced back to a Chinese scientist named Qian Xuesen (钱学森, a.k.a. Hsue-Shen Tsien), who studied at MIT and worked for a time at Caltech before being deported to China during the Red Scare, after which he helped the CCP develop the atomic bomb and intercontinental ballistic missiles. During his studies in the United States, Qian learned of and began to follow the work of cybernetics and information theory pioneers such as Norbert Wiener and Claude Shannon. He used these concepts in his own work, and then brought cybernetics concepts back with him to China.[119]

Qian himself first drew upon cybernetics theory in his engineering work, but later concluded – as he put it in an article in 1978 – that systems engineering approaches offered a "technology of organizational management" that could be used much more widely.

He promoted it as "a holistic and comprehensive method to chart and optimize the relationship of elements within a complex system," and advocated for systems engineering as a means by which to do things such as regulate nationwide industrial and agricultural production.[120]

His work has been enormously influential, and Qian is still the only PRC scientist ever to have been declared by the CCP a "Scientist with Distinguished Contribution to the Nation" (国家杰出贡献科学家).[121] With "systems engineering-based principles" today playing an important role "in contemporary Chinese governance," Qian can be regarded as the father of "the Chinese school of systems engineering."[122] Qian's work was so influential that his approach to systems engineering was taught for a long time at the Central Party School in Beijing, exposing today's leaders to systems engineering as they rose through the ranks.[123]

Qian's disciples – including a man named Song Jian who later rose to very high rank, running the PRC's State Science and Technology Commission and ultimately being given a seat on the State Council – took his thinking even further, trying to apply cybernetic insights in social management initiatives such as China's infamous "one-child policy" and national price controls. Another early voice suggesting that social management could be achieved on the basis of cybernetics-based insights was the Marxist theoretician Yu Guangyuan. Yu wrote in 1977, for instance, that like the application of natural science to Marxism itself, China's "modernized production management and social management established based on automation also require widespread application of the technologies stemming from modern natural science."[124]

As Samantha Hoffman has recounted, a "critical aspect of this different way of problem solving" was that it

> views a system as an organism in a dynamic, non-linear environment. As it relates to social management, the way of thinking is not limited to the potential application of technology itself, but is inclusive of how the social

> management system must be designed before automation objectives can be realized.[125]

Such thinkers believed that cybernetics ideas could be used to solve complex social problems, using an approach that Qian called "meta-synthetic engineering" and Song termed "social cybernetics." They viewed Chinese society as an "open complex giant system" of economic, political, and ideological subsystems, and believed it would be possible to "harmonize" all the elements of that system through a "meta-synthetic" approach to cybernetic management. This approach was hugely influential, and by the 1990s had become the central framing for CNP.[126]

In short, these thinkers believed cybernetics-derived approaches could be a general-purpose means for Party control and management of all Chinese society. As early as 1980, for instance, Jin Guantao, Liu Qingfeng, and Fan Hongye – scholars associated with what was called the "Toward the Future Group" – published an article entitled "Cybernetics and Institutional Reform" (*Kongzhilun yu zhidu gaige*) which "describe[d] society as an information/control system with feedback and readjustment capabilities."[127] Taking things a step further, in a landmark 1984 article in *People's Daily*, Song Jian

> laid out a vision for systems engineering to take the place of all decision-making processes. In the ideal scenario, the government would create a central authority to manage the entire cybernetic apparatus and train specialized technicians to staff it.[128]

Such thinking again shows the tight links between complexity thinking and CNP, for CNP theory represents an effort to apply cybernetic control to the complex adaptive system of national power. In fact, another of Qian Xuesen's protégés was Huang Shuofeng, one of the pioneers of CNP theory. He adopted the meta-synthesis methodology for computing CNP in his 2006 book on CNP theory, the last before his death. He viewed the national system, and the CNP system more specifically, as a giant-complex open system in which internal elements were constantly interacting with one another, and in

which the whole system was subject to interaction with factors from outside the system.[129]

Huang's work established the basic ways in which the constituent elements of CNP are explained within China's broad literature on CNP, and the "systems" aspects of comprehensive power are clearly visible in his observations about how each element, as well as its myriad sub-indices, both relies upon and can *reinforce* the other constituent elements. This understanding of their interactions also shapes the development strategies outlined in the CCP's Party Charter, in which each strategy, operating within the giant-complex open system, also both reinforces and relies upon each of the others.

It was the ambition of China's CCP cyberneticists, in short, to build for the Party what Dylan King has called a "cybernetic political apparatus."[130] Huang Shuofeng's work attempted to give the CCP analytical and policy tools through which to maximize CNP, while others such as Song Jiang worked on more specific policy challenges, but all worked within a broad conceptual paradigm of complex systems engineering that descended from Qian Xuesen.

Song's attempt to apply such thinking in the "one-child policy" seems to have been, on the whole, a catastrophic failure. Nevertheless, such systems-theoretical approaches to social control have received broad and continuing support from CCP leaders. President Hu Jintao, in fact, explicitly praised Qian Xuesen's work in 2008, saying that he had become familiar with Qian's approach when studying at the Central Party School in the early 1980s.[131] This was no coincidence, for Qian's work was *required* reading there, illustrating its importance to the CCP's understanding of the world.

Such theories, moreover, have proven enormously influential – and, alas, more successfully so – with the Chinese security services, who have enthusiastically taken up the challenge of building the CCP a cybernetics-informed approach to fighting crime and policing dissent among the Chinese people. As King has noted,

> … [a]part from population planning and price controls, the most consequential early adoption of systems engineering turned out to be within the Public Security Bureau (PSB). … [Qian and Song's] involvement with [what Qian called] legal systems engineering, and thereby how Chinese leaders built the security state over the following decades, has been by far their most lasting legacy on the daily operations of government.[132]

The sinister and ever-expanding apparatus of society-wide government and Party surveillance within China – pioneered in provinces such as Xinjiang, where it is employed to suppress Muslim Uighur culture and political feeling,[133] as well as in China's so-called "social credit score" system[134] – thus owes much to cybernetics theories that were brought to China with Qian Xuesen and adopted for CCP "social management" purposes by the security services. As Samantha Hoffman has noted,

> … [s]ocial management … has long been a critical concept describing an ideal-type governance system that serves the Party-state leadership's power-securing objectives. Social management, therefore, is a process that "programs" China's state security (国家安全).[135]

This systems-theoretical approach to social management fit in well with some aspects of prior Maoist theory. According to Hoffman,

> … [a]t its core, social management is an expansion of the Maoist "Mass Line" ideological mobilization methodology. This methodology generates a feedback loop: it is a continuous process of shaping, managing and responding. The process is explicitly directed at securing and advancing the CCP's power. Implementing this social management process requires the creation of a complex system of governance addressing many aspects of state control, yet one that is flexible enough to manage competing, changing[,] and often conflicting challenges.[136]

Qian Xuesen himself conceptualized systems science as fitting within the philosophical framework of Marxist dialectical materialism. According to Qian, as Alex Stone has summarized,

> in due time, the entire body of knowledge generated from systems science could be abstracted to create a branch of philosophy he called *Xitong Guan* [系统观], which would eventually become an integral part of dialectical materialism. Qian saw dialectical materialism and other Marxist teachings as providing the highest form of guidance on systems science.[137]

By the Deng Xiaoping years, there had developed what Bill Brugger and David Kelly termed a "cyberneticist" school of thought within Chinese Marxist theory, whose adherents represented "a scientistic reductionism geared to the ends of the four modernizations (industry, agriculture, science and technology, and national defense)" propounded by CCP leaders.[138] With the encouragement of Zhao Ziyang (Chinese premier 1980-87, and CCP general secretary 1987-89), in fact, "large numbers of Chinese modernizers turned in the 1980s to the works of [Western] futurologists such as Daniel Bell, John Naisbitt, and Alvin Toffler,"[139] as well as the complexity scientist Ilya Prirogine, who influenced many Chinese intellectuals in this period."[140]

Chinese scholars influenced by such writings came to believe that systems thinking and its application to Chinese developmental challenges might permit the country to carry out a "*new* leap" forward to achieve "Marx's third stage of development – planned production in communism."[141] As Chinese worked to "apply system theory, cybernetics, and information theory to the process of reform," there was a "sudden transfusion of systems theory into Marxism"[142] that produced a veritable "systems fever" of "Chinese Marxist scientism."[143] Using systems thinking, it came to be believed, technology could be used to control ecology – even *societal* ecology.[144]

Important strains of this thinking have continued into the present day. Chinese strategic writers still stress the close ties between

such thinking and traditional Communist dialectics, signaling the importance of cybernetics-derived "systems" approaches to the Party's continued rule and power. One recent account, for instance, depicts "system governance (系统治理), system engineering (系统工程), [and] system thinking (系统思维)" as being ideologically central to the CCP project:

> Dialectical materialism believes that everything is interconnected and interdependent. The system concept is an important epistemology and methodology of Marxist philosophy, and is one of the standpoints, views[,] and methods that runs through Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era. ... Entering the new era, the Party Central Committee with Comrade Xi Jinping as the core has insisted on systematic planning (系统谋划) and coordinated promotion of various undertakings of the Party and the country.[145]

"Adhering to system integration (系统集成)," therefore, is said to be essential to successful "overall planning and system governance."[146]

And most of this can indeed be traced back to Qian Xuesen. As he saw it, doing this effectively required the development of specific institutions and specific methodologies that would permit the government to engage "meta-synthesis" (综合集成方法论) or "meta-synthetic engineering." As Alex Stone recounts, this method "integrates empirical judgments and quantitative analysis and, according to Qian, represents a unity of holism and reductionism." The objective is to derive "quantitative knowledge from qualitative understanding," and it is carried out through the interaction of three subsystems: an expert system (专家体系), a knowledge system (知识体系), and a machine system (机器体系), which together constitute a complex giant system in and of itself."[147]

> In [Qian Xuesen's] vision, Chinese Party and state leaders can effectively macro-manage a wide variety of activities

> at the state level (an open, complex, giant system) through a defined decision-making process (meta-synthetic engineering) that integrates empirical judgments and quantitative analysis (meta-synthesis) based on a vast amount of information collected via an intelligence network and database. This policymaking process, carried out via an overall design department (总体设计部) acting as an advisory body staffed with senior experts, would enable systems-oriented, holistic, scientific planning at the highest level and minimize the negative impacts from the prior bottom-up, uncoordinated, ad-hoc policymaking practice.[148]

Wiring the System for Control

In general, as a means of control, "[c]ybernetic regulation of a system requires accurate sensors" and reliable "effectors" in the system.[149] To simplify the jargon, it might be said that in practice, in order to "exert what might be called 'effective control' over a large and diverse society"— that is, to "influence large masses of people into desired patterns of behavior in the aggregate, relying as much as possible upon autonomous choices, rather than detailed, individual directions" – the CCP

> needs at least two things: (1) tools of discipline with which to shape societal actors' incentives by rewarding desirable behaviors and punishing deviant ones; and (2) a system of pervasive surveillance that gives authorities a reasonable likelihood of being able to tell who is conforming and who is not, so that such rewards or punishments can be applied to them as needed.[150]

As Stone has noted, Qian Xuesen himself stressed the importance of "[a]n intelligence network and database (情报网和情报资料数据库)" for tracking "economic activities, daily life activities, scientific and technological developments, and other important aspects of economic and social life, as well as "[s]upercomputers to

process the vast amount of information collected."[151] This corresponds closely to the cybernetic requirement for sensory instrumentation of the system to be controlled, as of course the CCP's array of coercive tools within China provides the abovementioned "tools of discipline."

And this has indeed been this philosophy that underlies the modern expansion of the CCP's domestic surveillance state.

> To establish a "peaceful China" (平安中国), the government seeks to create smart- and safe-cities and communities. This includes concerted efforts to leverage new digital technologies to monitor target groups and pre-emptively detect risks to public order and the party. As part of the so-called grid management system (网格化管理), grassroots party personnel are made responsible for a designated number of individuals, to monitor threats and mitigate issues where possible. … Building on the Great Firewall and other Internet controls advanced by Hu Jintao, the current leadership has also invested heavily in controlling online spaces.[152]

These efforts are powerfully reinforced by Xi Jinping's notion of "comprehensive national security" (总体国家安全).[153] Officially introduced in 2014, this "CNS" concept "now comprises 16 security arenas deemed essential to China's development and the party state's survival by keeping China domestically stable and internationally thriving."[154] Xi views this paradigm as

> a core component of party ideology, a state doctrine that permeates all aspects of China's governance. Today, national security work in China is not only meant to avert threats but to proactively identify any potential new threats – domestic and international – that the party must adapt to. This has spurred a rapid expansion of what is considered a matter of national security. The expansion is not one of mission creep, but rather takes place by design.[155]

The "comprehensive national security concept" (总体国家安全观) has provided the CCP with "a unifying theory that combined internal and external security concerns and guided policy choices across the board."[156]

It is easy to see the applicability of such approaches to internal policing, of course, with the grotesque manifestation of these approaches obvious in the ongoing CCP human rights abuses that are endemic in modern China. What is less well understood, however, is that such thinking also powerfully informs the PRC's relationships with the outside world and indeed its approach to implementing grand strategy in the geopolitical reana. The following pages will explore this idea further.

Cybernetic Grand Strategy

The reader will now understand that cybernetics-derived approaches to social control have gained broad currency in the PRC, to the point that Xi Jinping himself has emphasized the importance of "automating" social management through "more systematic and innovative social governance, stressing the need to improve the capability to predict and prevent security risks."[157] At the macro level, Samantha Hoffman has described this as a process of "engineering China's autonomous nervous system."[158]

The ambitiousness of this thinking is hard to overstate. In 1979, Qian Xuesen and a coauthor, Wu Jiapei (乌家培), published a article that further broadened the notion of the type of "system" that could be controlled through effective systems engineering to include "an entire society" (整个社会) or "an entire nation" (整个国家).[159] In this conception, as suggested earlier, societies are Open, Complex, Giant Systems (OCGSs) that have "human beings as their main subsystems,"[160] and Qian and his followers believed that good engineering techniques would enable rulers to manage them much like other complex systems.

This idea proved very appealing a CCP leadership looking for organizing principles in the years after Mao Zedong's death and Deng Xiaoping's policies of "Reform and Opening" had robbed them of the ideological certainties of Maoist revolution. Qian, in fact, claimed to have stepped down from his post of Deputy Director of the Committee for National Defense and Technology (国防科学技术委员会副主任) in the late 1970s at the request of Premier Zhou Enlai, who urged Qian to try to apply his theories to aspects of national development beyond defense technology.[161]

Zhao Ziyang (赵紫阳) began referring to complex systems engineering ideas in the early 1980s,[162] and as Premier told the 13th CCP National Congress in 1987 that China's process of reform was "a grand systems engineering undertaking (改革是一项伟 大的系统工程)."[163] By the early 1990s, in fact, the CCP's appreciation for Qian's work and his social management theories had grown to the point that President and General Secretary Jiang Zemin and Chairman of the National People's Congress Standing Committee Li Peng could declare in 1991 that

> Qian Xuesen's dedicated research on engineering cybernetics has since been developed into a complete set of system engineering theory, which has found wide applications in numerous fields from military operations, agriculture, forestry, to even social and economic development, and has played a crucial role in China's modernization endeavor.[164]

During Hu Jintao's (胡锦涛) tenure, "references to [systems engineering] became more ubiquitous,"[165] to the point – as Alex Stone describes – that "social engineering-enabled 'top-level design'" became "a philosophy of governance."[166] According to Xi, systems thinking is clearly the key to effective grand strategy. He explicitly describes his agenda of "[c]omprehensively deepening reform" as being "a complex systems project." As *Xinhua News Service* has recounted,

> Xi Jinping pointed out that the comprehensive deepening of reform is a complex system project, which requires strengthening the top-level design and overall planning, and strengthening the relevance, systematicity and feasibility studies of various reforms … so that various reform measures can cooperate with each other in terms of policy orientation, promote each other in the implementation process, and put them in practice. The results complement each other.[167]

As Stone describes it, under Xi Jinping, such concepts are clearly at the center of CCP thinking.

> Under Xi Jinping's tenure (2012-Present), concepts and terms informed by [systems engineering] have been formalized in senior leaders' discourse on strategic issues to the extent that they appear as frequently as references to values like freedom and democracy appear in U.S. Presidents' rhetoric. Xi has repeatedly demanded [that] CCP cadres ... use "systems science, systems thinking, and systems approaches" to examine and solve problems, and upholding a "systems mindset" was identified as one of five fundamental principles to guide economic and social governance during the 14th Five-Year Plan (FYP) period and beyond.
>
> CCP leaders see a systems approach to strategic planning and governance as an essential skillset and argue that these approaches have not only contributed to the success of China's strategic weapons development and the aerospace industry, but have also guided and informed Chinese practices in economic, social, and military management and development. …
>
> As a result, the best approach is to strengthen "top-level design" (顶层设计) and "holistic planning" (整体谋划) through

> careful research into the connectedness (关联性), "systemness" (系统性) … and feasibility of reform measures.
>
> Under Xi's tenure, the term and its associated concepts have become even more ubiquitous in China's policy discourse on strategic issues. … Xi made the most forceful case for "top-level design" when he addressed the Third Plenary Session of the 18th Chinese Communist Party (CCP) Central Committee in November 2013 in Beijing, prior to launching one of the most extensive rounds of reforms in PRC history. … Xi Jinping has also extended the emphasis placed on systems thinking, holistic approaches, and top-level design to the discussion of other important policy priorities.[168]

So how do such approaches work in practice? As applied to controlling the behavior of the myriad human beings in the OCGS of society, this approach relies both upon ongoing state intervention and upon allowing some degree of autonomy to all actors in the system, which they exercise within a context of behavioral incentives established and manipulated by that state:

> Such an incentives-based system of trained conformity does not attempt to deny or substitute for individual human agency, but instead seeks to coopt such agency. To the extent that this works, these methods are far more scalable to complex societies and large populations than direct control. This represents, if you will, "new school" authoritarianism.[169]

As Hoffman summarizes, in the Communist Party's information-theoretical vision,

> society's self-regulation and residents' self-governance reinforce each other. Self-management, however, does not imply [complete] autonomy. Instead it describes the ideal function of the CCP's governance system. To achieve self-

> management requires the successful automation of government functions through a combination of cooperative and coercive government tactics. …
>
> This process can be described as the interaction of two channel types: a Sensory Channel and a Motor Channel. The Sensory Channel describes the capacity to sense the state and changes in its internal and external environment (or "Monitoring" and "Analyzing" the current state and environment). The Motor Channel describes how an attribute, reacting to and countering the effects of changes, adapts to maintain equilibrium (or the "Planning" and "Execution" of decisions and change). The successful operation of this process means that a system is constantly adapting in order to prevent faults and to handle faults when they inevitably occur. The end goal is not a system without faults. The goal is a system capable of ensuring that faults do not cause the entire system to collapse.[170]

From the perspective of grand strategy, however, "the system" in question isn't just China itself, but rather also – in effect – the entire global community. And, indeed, a great deal of Beijing's activity in the world during the last decade can be seen as an attempt to develop and deploy what are in effect the kind of cybernetic "sensors" and "effectors" the CCP needs to export "this theory of social control — increasingly, and by degrees—to implement this theory in the rest of the world."[171]

Global Cybernetic "Sensors"

In terms of "sensors," one key aspect of China's "Belt and Road Initiative" (BRI) of PRC-financed infrastructure projects with foreign partners has been the "Digital Silk Road" (DSR). The DSR effort dates back at least to a 2015 white paper released by the PRC State Council, which spoke of the need to develop an "Information Silk Road" through which China would provide both hard infrastructure (*e.g.*, cellular telecommunications networks) and soft infrastructure (*e.g.*, software applications, mobile payment platforms, and cloud

computing services) to developing countries, thus becoming their primary technology supplier. As Rahul Karan Reddy has recounted,

> … [c]ore DSR technologies include telecommunications infrastructure, internet cables, data centers, cloud services, OTT (Over-the-Top) platforms and consumer electronics. These technologies encompass most sectors of the digital economy, from cellular networks and internet cables necessary to support internet access to mobile phones and applications that provide access to video games, mobile payments and e-commerce platforms. Together, the bundle of technology goods and services is sometimes referred to as the tech stack: hard and soft infrastructure that enables users to access technology services like mobile payments and e-commerce through goods like mobile phones and internet cables.[172]

This has included projects such as installing thousands of surveillance cameras in Nairobi connected to central monitoring hubs – ostensibly for crime-fighting under the auspices of "Safe Cities" assistance[173] – as well as a contract with Ethiopia under which Chinese technology companies "basically *took over* the country's entire national telecommunications network,"[174] with the result that "Ethiopia's [government] monopoly [on telecommunications] effectively became China's monopoly."[175] In general, as the Council on Foreign Relations has observed, DSR assistance

> goes toward improving recipients' telecommunications networks, artificial intelligence capabilities, cloud computing, e-commerce and mobile payment systems, surveillance technology, smart cities, and other high-tech areas.

Chinese companies provide such recipients with a range of services, including Internet connectivity, video surveillance, cell phones with GPS location capabilities, and biometrics systems that feed into centrally managed-data centers – generally with China itself serving as the resulting data hub.[176]

Chinese officials are firm believers in the power of information to empower control and management. It is already well understood that the PLA views information management as being key to dispelling the "fog of war" and prevailing in a military conflict,[177] regards "strengthening the military" as a "complex systems project," and calls for all Chinese military leaders to have "a system concept (系统观念)" approach.[178]

Much more broadly, however – and significantly, from a strategic perspective – the CCP now considers "data" to be a "new factor of production," the state control and management of which is just as important as any *other* factor of production through the prism of Marxist-Leninist theory.[179] The beginnings of this conclusion can be seen in Chinese "futurist" Marxist theory from the early 1980s, for some such thinkers came to believe that "*information* – or at least highly generalized and manipulable codified data – is integral to some of the most important new productive forces in advanced capitalist societies.[180] Building in part upon Karl Marx's discussion in the unfinished manuscript of the *Grundrisse* – which he had intended to release as *Foundations of a Critique of Political Economy*, but which he died before publishing – these Chinese scholars soon came to argue that "information is *itself* a productive force."[181]

Such speculation tied systems thinking and Marxist theorizing quite closely together. (After all, in the *Grundrisse*, Marx had made clear that there was "no such thing as an independent variable; all is connected and all is dependent."[182]) In effect, complexity science was seen as a modern, network-dynamics-focused way of expressing Marxian insight, and systems-based *engineering* a way of approaching the understanding, measurement, and ultimately *manipulation* of complex social systems in order to bring the dialectics of socialist development to their apogee. As complexity science has tried to "advance[] the tools of cybernetics and systems science to study … society as a complex system," *Western* experts may feel that they have not yet "arrive[d] at any sort of formal or explicit theory of social

complexity or social systems."[183] *Chinese* Marxists, however, certainly believed they have.

Conclusions about the centrality of data in Chinese Marxism and national strategic planning are now commonplace. As it has been explained much more recently, for instance,

> … [a]s a new factor of production, data is the foundation of digitalization, networking, and intelligence. It has been rapidly integrated into production, distribution, circulation, consumption, and social service management, profoundly changing production methods, lifestyles, and social governance. The construction of data infrastructure system is related to the overall situation of national development and security.[184]

The CCP Central Committee and the PRC State Council have declared "systematic planning to maintain national data security" to be a national priority, and that China needs to "promote the formation of a new production relationship" on this basis. In an important 2022 CPC Central Committee and State Council "Opinion" on the importance of the "Data Basic System," data is explained to be "related to the overall situation of national development and security," making data of central importance.[185] To this end, the CCP seeks to build and manage a general "data circulation system that can define the scope of use [of data], trace the circulation process, and prevent security risks."[186]

It should now be easy to see how the expanding data and information networks of the BRI and other Chinese overseas engagement projects relate directly to CCP aspirations to social control. CCP domestic planning guidance documents focus strongly on what can only be seen as both a literal and a figurative effort to "instrument the system" of Chinese society for purposes of central management. The Central Committee's directives on improving infrastructure management, for instance, call for the establishment of "an efficient and authoritative national quality infrastructure

management system, and [to] promote the hierarchical and classified management of quality infrastructure."[187] They direct officials to

> … [d]eepen the reform and innovation of metrology technology institutions, promote the construction of a modern and advanced national measurement system, improve the quantity value transmission system managed by the country according to law and the market demand-oriented quantity value traceability system, and standardize and guide the development of the metrology technology service market.[188]

This focus upon instrumenting Chinese society also applies *politically*, with the Central Committee stressing the importance – in order to "construct[] … a strong country" by transforming China "from big to strong" by improving "quality" in the "economy, trade, science and technology, culture[,] and other fields" – of carrying "central quality supervision" and "inspection and assessment" work," and forming "an effective supervision, inspection and rectification implementation mechanism."[189] This broad focus upon the acquisition and control of data as a strategic resource – with all the mercantilism this implies, for such control could also entail (and in some cases might require) *monopolization* or *denial* – is obviously important in CCP domestic governance and social control strategies.

It would be a great mistake, however, to assume that this CCP thinking stops, as it were, at the water's edge. As projects such as the DSR illustrate, this is also true *internationally*. (According to a Taiwanese businessman based in Beijing, "[i]n the age of AI, if data is the new oil, China is the new OPEC.") As one 2022 analysis noted,

> an additional purpose of China's expanding worldwide Internet surveillance and data-mining is to stockpile data in anticipation of the day when advanced computing enables analysis of such data to unlock even more effective methods of social control.[190]

All that such an approach lacks, therefore, is a means of *using* the data thereby acquired in ways that drive the behavior of entities within the *global* OCGS into patterns congenial to CCP leadership in ways directly analogous to – if at present much less fully developed than – what the Party has been working for years to ensure within China.

Cybernetic "Effectors"

In terms of "effectors," of course, the CCP today enjoys – within China itself – an extraordinary range of coercive tools. After an earlier period of (relative) relaxation, the CCP has over the last two decades been steadily rebuilding the network of Party cells it maintains within private businesses in China, and this process has sharply accelerated under Xi Jinping. According to *The Economist*, for instance, CCP regulations "require that wherever three or more employees in a workplace are party members, they must set up a party branch." (Firms with seven or more members must also appoint a Party secretary.)

This gives Party leaders an enormous ability not just to monitor but also to *influence* the activities even of notionally "private corporations." Ye Qing, of the vice-chairs of the All-China Federation of Industry and Commerce, declared in 2020, for example, that Party branches in private firms should have "guiding power" on corporate personnel decisions. Since 2020, the Chinese government has "carried out waves of private sector regulation to discipline companies, align their actions with party priorities, strengthen party influence[,] and prevent the formation of power bases outside the CCP."[191]

The global technology firm Huawei, for instance – which operates in dozens of countries and professes itself "committed to bringing digital [technology] to every person, home and organization for a fully connected, intelligent world" – "cannot operate without the state's indulgence, and some hundred of its senior employees are regarded by Washington as linked to the military or intelligence agencies."[192] Huawei's holding company is theoretically owned by its workers, but they do not technically own its shares. Instead, these are

held by a trade union committee which falls under the All-China Federation of Trade Unions, which in turn is controlled by the CCP.[193]

On top of this structural ability through Party networks to dictate policies to "private" Chinese companies operating anywhere in the world, the CCP also

> sits atop a web of national security commissions that have been established or upgraded across the administration, from central to local levels. The party transmits its priorities and agenda through these commissions. They fulfill a coordinating function and ensure that nearly all state ministries, departments and government-funded organizations take part in safeguarding security in some way. Party organizations, too, must help uphold national security, down to party cells in education, the private sector and civil society. This framework keeps cadres and public officials on the lookout for potential threats. …
>
> All state and non-state actors are required to cooperate with authorities such as the Ministry of Public Security, the Ministry of State Security or military-affiliated intelligence forces, in cases relating to national security. China's security organs have extensive discretionary powers to access data, with little or no transparency or legal recourse. By institutional design, the CCP has steering power over all security organs and the judiciary, whose work is coordinated under the national security commissions system. No independent bodies monitor their actions that citizens and enterprises could turn to if faced with undue requests for cooperation.[194]

Thus has the Party given itself a powerful repertoire of "effectors" with which to undertake "social management" activities in China itself. Abroad, the CCP has fewer levers with which to intervene in the OCGS of the international arena, but it has steadily been working to build more. For one thing, many of the same mechanisms that give it the ability to exert control over the activities of Chinese

companies at home also allow control over them to be exerted overseas precisely to the degree that such companies operate abroad. This is itself an important lever of CCP influence in the rest of the world, for there are a great many Chinese companies operating abroad who in principle are subject to just such broad CCP direction. (According to a recent report by HSBC, Chinese businesses are "increasingly looking beyond the country's borders to find international opportunities," and are still only "at the early stages of their international journey." By 2017, it was estimated that there were already "more than 10,000 Chinese-owned firms operating in Africa" alone.)

China is also increasingly good at using its economic weight to incentivize non-Chinese actors in the rest of the world to adopt what the CCP considers good behavior. As Mark Galleoti has noted in discussing the phenomenon of "Schroederization" – a term coined by former Estonian President Toomas Ilves in reaction to Russia's co-optation of former German Chancellor Gerhard Schroeder by giving him a lucrative job with the Russian state oil monopolist Gazprom – "the individual-by-individual corruption of another country's politics in a wholly legal (if ethically problematic) way" is a "*leitmotif* of the modern world."[195] But while it is true that for avaricious people in the rest of the world, China's huge, expanding, trade-based economy has long had an effect "like gravity, warping orbits and raising tides without being visible to the naked eye," thereby making them less willing to push back against China and hold it accountable for abuses,[196] this has been far from a merely passive process.

To the contrary, empowered by the networks of dependency that have developed as a result of its economic growth – and which, as noted earlier, Beijing seems to have been deliberately cultivating – the PRC has been extraordinarily active in trying to *train* the rest of the world into congenial conformity with CCP expectations by wielding a range of pressures and sanctions to disincentivize even private citizens in foreign states from adopting policies or expressing views disfavored by Party officials. As one of the authors of this paper has elsewhere observed,

> Every time a Western company or celebrity faces PRC economic and commercial chastisement and is told to make a groveling apology for having "hurt the feelings of the Chinese people" by saying something the CCP dislikes, the CCP is trying to establish and reinforce habits of conformity. Every time a Western scholar is blacklisted and barred from doing work in China for inconvenient facts identified by his or her scholarship, the CCP is trying to train other scholars to be less impertinent. Every time a Western film studio faces exclusion from Chinese markets if China or the CCP is portrayed less than favorably in a screenplay, the Party is laying down a marker about how we must all describe China in the future. And every time a country faces PRC economic warfare for rejecting Beijing's political demands, it is pressured by China to change how it teaches history to its own schoolchildren, or it is punished for showing some degree of solicitude to Taiwan, the CCP is working to establish and reinforce global docility.[197]

With respect to China's efforts to build a form of global "discourse control" by "grabbing the microphone" in international affairs,[198]

> … [t]he net effect of these efforts is to export the kind of … environment that CCP censors have imposed within China itself. As one U.S. professor noted in analyzing recent changes in China's extraterritorial laws, the point of these laws isn't directly to control or punish all China-related speech everywhere but rather to use the threat of coercive pressures "to put the fear of God into all China critics the world over." The CCP, in other words, aims to learn how different societies react to different stimuli, including threats and rewards, so as to secure the Party's position even more effectively in the future: it aims to make China's [coercive influence system] as efficient and effective as possible, everywhere.[199]

Seeing this global project as merely a global censorship effort, however, would be to miss both its subtlety and its ambition. Over time, as Galeotti has noted, the effects of such sustained coercive pressure gradually "accumulate, slowly building habits of deference and cooperation." Significantly, they can also be "combine[d] with other instruments of modern conflict" for potentially synergistic effect:

> It is far easier to shape the narratives that drive politics and policy if another country's media is already tamed, its experts compromised and its politicians bought and paid for (or at least rented from time to time). With not just money but also an already-favourable local establishment consensus, shaping laws and influencing policy becomes rather more possible. In other words, money is not just a weapon in its own right, it also makes all the other weapons … that much more powerful.[200]

This thus represents another way in which the feedback loops and reciprocal causalities of systems thinking refract through CCP strategy. As one Chinese writer put it, "[s]ynergy theory is the core point of the system concept."[201]

Controlling foreign discourse is thus only one part of the CCP's objective. More broadly, the whole panoply of PRC overseas engagements – including trading relationships, "Confucius Institutes," overseas "police stations," a growing institutional capacity for sanctions warfare, diplomatic and security relationships, BRI and DSR infrastructure projects, involvement in global technology standards-setting bodies,[202] overseas lending, tourist travel, Olympic sports participation, military power projection and expeditionary warfare capabilities, United Nations peacekeeping operations, the export of film and television products, and overseas activities by major technology firms, to name a few – can be seen as a deliberate effort to build webs of connectivity with China that form dependency relationships that can be manipulated by the Chinese Party-State in furtherance of its strategic objectives.

Individually, of course, any developing country might presumably like to expand in many of these ways. (Who, for instance, does not wish to have more competitive technology companies or to win more Olympic medals?) Yet the modern CCP's doctrinal emphasis upon systematic management and leveraging of "system"-type relationships in support of "national rejuvenation," the notable cross-cutting consistency of relational trends across of the country's foreign relationships,[203] and the underlying assumption of CNP theory that superlative comprehensive national power conveys mastery of the geopolitical terrain, together, point toward a deep and holistic intentionality.

This is exactly what one might expect from the CCP's clear focus both upon the "comprehensiveness" of national power and upon the utility of an essentially *cybernetic* concept of using systemic influence for purposes of social control. In our view, the various aspects of Chinese strategy

> are not intended to be, nor are they in fact, effective merely linearly – that is, through the summation of or direct extrapolation from their various economic, technological, political, informational, diplomatic, military, and socio-cultural effects. Rather, they aspire, at least, to a sort of "systemic" coherence and extra impact through the relationships between them. … China's effort [is thus] to create what might be called a "leverage web" of mutually-reinforcing instruments of power and influence ….[204]

One aspect of the mutually-reinforcing aspects of PRC strategy that the U.S. Department of Defense has noted, for instance – but which has as yet gotten too little attention elsewhere – is the degree to which the CCP's Military-Civil Fusion Development Strategy (MCFDS) strategy also seems to be intended to ensure that as many of China's ostensibly civilian overseas engagements as possible are set up in ways that permit them to be subject to military use in time of crisis. Under something called the Fundamental Domain Resource Sharing System (FDRSS), for instance,

> military requirements [are built] into the construction of civilian infrastructure from the ground up as well as leveraging China's civilian construction and logistics capacities and capabilities for military purposes. This includes factoring military requirements and dual-use purposes into building civilian private and public transportation infrastructure such as airports, port facilities, railways, roads, and communications networks. This also extends to infrastructure projects in dual-use domains such as space and undersea as well as mobile communications networks and topographical and meteorological systems. Another element seeks to set common military and civilian standards to make infrastructure easier to use in emergencies and wartime. ... It may also have important implications for the PRC's overseas infrastructure projects and investments under BRI as the PRC seeks to establish a more robust overseas logistics and basing infrastructure to allow the PLA to project and sustain military power.[205]

In CCP parlance – especially now that Western attention to the implications of Military-Civil Fusion seems to have led Party officials to use that evocative firm less frequently – making sure that essentially *everything* is capable of supporting either civilian or military applications is called "double support work," and such work has been identified by Xi Jinping as a national priority.[206] The point here about such "fusion" is not that *either* civilian or military advantage is necessarily prioritized, but merely that national power is clearly conceptualized in "comprehensive" terms. The focus is not upon any given facet of power in particular, but about their *aggregation*, and the CCP's ability to draw upon them in coordinated and mutually-reinforcing ways, as a *system of power*, when and wherever it wishes to do so. Not for nothing, it would appear, has the CCP's Central Commission for Military-Civil Fusion Development (CCMCFD) (中央军民融合发展委员会) – a body chaired by Xi Jinping himself – emphasized the "system engineering" nature of MCF development.[207]

The point of all such systems thinking by the CCP, of course, is about strategy and advantage, both at home and abroad – which means that it is fundamentally about *control*. Today, merely "[g]etting rich isn't China's big project anymore; the project is power."[208] And just as it is understood by CCP strategists that "the principle of complexity" needs to be followed in military operations in making "good use of complexity theory to support planning,"[209] so too are Qian Xuesen-style cybernetic approaches to be used in instrumenting and influencing the world so that China is able to exert more and more "effective control" over its strategic environment along the path to its world-historical "national rejuvenation."

The CCP's grand strategy is a cybernetic-based one that embodies a "system of strategies" (战略体系) approach – in the words of Alex Stone and Peter Wood – which aspires to "the creation of a new, more complex system which offers more functionality and performance than simply the sum of the constituent systems.[210] Thus are systems thinking and CNP theory intimately tied together in the service of China's grand strategy of returning to systemic global hegemony.

Conclusion

It seems quite clear today that complex systems concepts – an intellectual framework imported to China via Qian Xuesen's study of Western cybernetics and information theory – have been enthusiastically adopted by the CCP as part of an ambitious agenda of shaping, manipulating, and managing not just the "open complex giant system" of China itself, but also that of China's overall strategic environment. Such cybernetics-inflected approaches to social control, in fact, arguably represent one of the CCP's most distinctive contributions to political theory and practice – albeit tragically, given that such intellectual energy, effort, and sophistication is being marshaled primarily for purposes of oppression at home and imperialism abroad.[211]

As a means by which both to build and to *leverage* China's growing CNP as Beijing pursues its desired strategic end-state of Sinocentric geopolitical "return," the concept of cybernetic social control – both in its more elaborate domestic and its emergent international forms – provides a lens through which to understand a great deal of the modern CCP's observed behavior. We hope that this analysis will help spur further attention and research into China's evolving "social technology" of influence, manipulation, and control, and that the fruits of such work will usefully inform leaders and publics in the non-Chinese world as they struggle to deal with the many challenges that such a "comprehensive" and "complex systems"-focused Chinese grand strategy presents for the rest of humanity.

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The views expressed are those of the authors and do not reflect the official policy or position of the Department of Defense or the U.S. Government, nor necessarily those of anyone else.

Notes

1 We concede that "Chinese Communist Party" is probably not the best translation of the Chinese phrasing, and that "Communist Party of China" is a better rendering. Because most U.S. usage has standardized around "CCP," however, we will employ that here in order to avoid confusion.

2 Scott E. Page, *The Model Thinker: What You Need to Know to Make Data Work for You* (Basic Books, 2018).

[3] Christopher A. Ford, "Systems and Strategy: Causal Maps, Complexity, and Strategic Competition," MITRE Corporation *Occasional Papers*, vol. 1, no. 7, November 14, 2022, 6 (citing Göktug Morçöl, *A Complexity Theory for Public Policy* (Routledge, 2012), 148), https://irp.cdn-website.com/ce29b4c3/files/uploaded/Systems%20and%20Strategy%20Paper%20FINAL2.pdf.

[4] *See, e.g.*, Page, *The Model Thinker*; Scott E. Page, *Diversity and Complexity* (Princeton University Press, 2011); Göktug Morçöl, *A Complexity Theory for Public Policy* (Routledge, 2012); M. Salzano, "Economic policy hints from heterogeneous agent-based simulations," in *Complexity and policy analysis: Tools and methods for designing robust policies in a complex world* (K. Richardson, L. Dennard, & G. Morcol, eds.) (ISCE Publishing, 2008); Christopher A. Ford, "Arms Control and Disarmament Through the Prism of Complexity: Advent of a New Research Agenda," remarks to the AAAS/Hoover Institution Nuclear Security Dialogue Group, October 1, 2021, https://www.newparadigmsforum.com/arms-control-and-disarmament-through-the-prism-of-complexity-advent-of-a-new-research-agenda; Christopher A. Ford, "Musings on Political Ideology Through the Lens of Complexity," paper presented in Sydney, Australia, January 19-20, 2011, https://irp-cdn.multiscreensite.com/ce29b4c3/files/uploaded/Ford%20on%20Complexity%20and%20Ideology.pdf; Christopher A. Ford, "Musings on Complexity, Policy, and Ideology," in *World Politics at the Edge of Chaos: Reflections on Complexity and Global Life* (Emilian Kavalski, ed.) (SUNY Press, 2014), 79-109.

[5] Thomas A. Kuhn, *The Structure of Scientific Revolutions, 50th Anniversary Edition (4th Edition)* (University of Chicago Press, 2012), 43-51.

[6] *See* Kuhn, *The Structure of Scientific Revolutions*, 173-99 (postscript, written in 1969 for the release of the 2nd edition, which Kuhn explained was necessary in order to clarify his understanding of the concept of paradigm and paradigm shifts).

[7] *See* Kuhn, *The Structure of Scientific Revolutions*, 10-13.

[8] Ibid., 35-38.

[9] Ibid., 177-178.

[10] Ian Hacking, introductory essay in Kuhn, *The Structure of Scientific Revolutions*, xxx-xxxv. Hacking speaks to Kuhn's concept of "Incommensurability" between existing and emerging paradigms, succinctly describing the effect we reference.

[11] Bill Brugger and David Kelly, *Modern Marxism in Post-Mao China* (Stanford University Press, 1990), 70.

[12] Dylan Levi King, "A Brief History of Chinese Cybernetics," in Yuk Hui Edited, *Cybernetics for the 21st Century, Volume 1: Epistemological Reconstruction*, (Hanart Press, 2024), 171-202

[13] Dylan Levi King, "On Chinese Cybernetics," presentation to the Cybernetics Society, posted to YouTube, February 12, 2024, https://www.google.com/search?q=Dylan+King+cybernetics#fpstate=ive&vld=cid:a1b4ef72,vid:xS7dV9_3oe0,st.

[14] Xi Jinping 习近平, "Hold High the Great Banner of Socialism with Chinese Characteristics and Strive in Unity to Build a Modern Socialist Country in All Respects—Political Report at the 20th National People's Congress," 高举中国特色社会主义伟大旗帜 为全面建设社会主义现代化国家而团结奋斗——在中国共产党第二十次全国代表大会上的报告, "*Gaoju Zhongguo Tese Shehuizhuyi Weida Qizhi, Wei Quanmian Jianshe Shehuizhuyi Xiandaihua Guojia Er Tuanjie Zhengdou – Zai Zhongguo Gongchang Dang Diershici Quanguo Daibiao Daguo Daibiao Dahui Shangde Baogao*," *Xinhua* [新华], October 25, 2022.

[15] The Chinese phrase 综合国力is sometimes translated differently in different contexts. Sometimes, for instance, it is rendered "comprehensive national strength," "composite national strength," or "overall national power" rather than "comprehensive national power." (This variation in official translations may or may not be deliberate, but one should not think that such variation in English translation means that different things are meant.) We believe the English word "comprehensive" better captures the CCP's holistic approach to systems thinking, in which the whole is greater than the sum of its parts. Similarly, we feel that "power" more directly signals national agency and optionality in a dynamic environment than simply the word

"strength." (It is also helpful that "CNP" is phrasing that has already become widely used in the West in the context of Chinese strategic thinking.) In this paper, we will thus use the most common translation of "comprehensive national power" whenever 综合国力 appears, thus also using the convenient acronym "CNP."

16 Samantha Hoffman, "Programming China: The Communist Party's autonomic approach to managing state security," *Merics China Monitor*, December 12, 2017, https://merics.org/sites/default/files/2020-05/Programming%20China.pdf.

17 Alex Stone, "'A Complex Systems Engineering Undertaking' – The Qian Xuesen School of Systems Engineering," Blue Path Labs (China Aerospace Studies Institute: February 2024), https://www.airuniversity.af.edu/Portals/10/CASI/documents/Research/Infrastructure/2024-02-20%20Complex%20Systems%20Engineering.pdf.

18 Dylan Levi King, "The Genealogy of Chinese Cybernetics," *Palladium*, October 17, 2022, https://www.palladiummag.com/2022/10/17/the-genealogy-of-chinese-cybernetics/.

19 Josh Chin & Liza Lin, *Surveillance State: Inside China's Quest to Launch a New Era of Social Control* (St. Martin's Press, 2022), 74-81.

20 Mark Cozad, Jeffrey Engstrom, Scott Harold, Timothy Heath, Sale Lilly, Edmund Burke, Julia Brackup, & Derek Grossman, *Gaining Victory in Systems Warfare* (RAND Corporation, March 1, 2023); Jeffrey Engstrom, *Systems Confrontation and System Destruction Warfare: How the Chinese People's Liberation Army Seeks to Wage Modern Warfare* (RAND Corporation, February 1, 2018).

21 For an outstanding analysis of Military-Civil Fusion, *see* Alex Stone & Peter Wood, "China's Military-Civil Fusion Strategy," China Aerospace Studies Institute, June 15, 2020, https://www.airuniversity.af.edu/Portals/10/CASI/documents/Research/Other-Topics/2020-06-15%20CASI_China_Military_Civil_Fusion_Strategy.pdf.

22 CCP Central Committee and the State Council, *Outline of the National Innovation-Driven Development Strategy* (published by *Xinhua News Agency*, May 19, 2016), https://cset.georgetown.edu/publication/outline-of-the-national-innovation-driven-development-strategy/ (Chinese source: http://www.xinhuanet.com/politics/2016-05/19/c_1118898033.htm).

23 The CCP's 19th National Congress added pursuit of BRI to the text of the PRC Constitution. *See* "'Belt and Road' Incorporated into China's Constitution," *Xinhua News Agency*, October 24, 2017, http://www.xinhuanet.com/english/2017-10/24/c_136702025.htm.

24 *See* Ford, "Systems and Strategy," 12-13.

25 *See, e.g.*, Sunzi, *The Art of War*, 3:18 ("If you know the enemy and know yourself, you need not fear the result of a hundred battles.") https://classics.mit.edu/Tzu/artwar.html.

26 Christopher A. Ford, *The Mind of Empire: China's History and Modern Foreign Relations* (University Press of Kentucky, 2010).

27 Ford, *The Mind of Empire*, 121-39.

28 Ibid., 141-56.

29 *See, e.g.*, Christopher A. Ford, "Xi Jinping, Michel Foucault, and Spy Balloons? Communist China's Theory of Control and Visions of a Post-Westphalian World Order," *National Security Law Journal*, vol. 11, no. 1 (2023), 17-33, https://www.nslj.org/wp-content/uploads/Ford-Xi-Jinping-Michel-Foucault-and-Spy-Balloons-Communist-Chinas-Theory-of-Control-and-Visions-of-a-Post-Westphalian-World-Order.pdf.

30 *See, e.g.*, Jürgen Osterhammel, *The Transformation of the World: A Global History of the Nineteenth Century* (Patrick Camiller, trans.) (Princeton University Press, 2014), 854 (describing China's "catastrophic military defeat at the hands of Japan in 1895" as "the last nail in the coffin for a Sinocentric view of the world").

[31] Christopher A. Ford, "Running Faster for the 'Commanding Heights' of the Next Industrial Revolution?" remarks at the Metron Corporation, September 12, 2023, https://www.newparadigmsforum.com/running-faster-for-the-commanding-heights-of-the-next-industrial-revolution. On Liang Qichao and the "Sick Man of Asia" trope, *see, e.g.*, Larson & Shevchenko, *Quest for Status*, 66 (quoting Liang).

[32] Christopher A. Ford, *China Looks at the West: Identity, Global Ambitions, and the Future of Sino-American Relations* (University Press of Kentucky, 2015), 90-91.

[33] Jurgen Osterhammel, *The Transformation of the World: A Global History of the Nineteenth Century* (Patrick Camiller, trans.) (Princeton University Press, 2014), 495 (quoting Liang).

[34] Ford, *China Looks at the West*, 106-07 (quoting Liang).

[35] *See* Zheng Wang, *Never Forget National Humiliation: Historical Memory in Chinese Politics and Foreign Relations* (Columbia University Press, 2014), 80-82.

[36] Anne-Marie Brady, *Making the Foreign Serve China: Managing Foreigners in the People's Republic* (Rowman & Littlefield, 2003), 144.

[37] C.P. Fitzgerald, *The Chinese View of Their Place in the World* (Oxford University Press, 1964), 49 & 72.

[38] Ford, *China Looks at the West*, at 126; *see also generally* Ford, *The Mind of Empire*, 203-16.

[39] National People's Congress, Outline of the People's Republic of China 14th Five-Year Plan for National Economic and Social Development and Long-Range Objectives for 2035 (published by Xinhua News Agency, March 12, 2021) [hereinafter "14th Five-Year Plan"], 83, https://cset.georgetown.edu/wp-content/uploads/t0284_14th_Five_Year_Plan_EN.pdf [Chinese source https://perma.cc/73AK-BUW2.]

[40] *Quoted by* Assistant Secretary of State for East Asian and Pacific Affairs David Stilwell, "U.S.-China Bilateral Relations and the Lessons of History," remarks at the Center for Strategic and International Studies, December 13, 2019, *available at* https://www.csis.org/analysis/speech-assistant-secretary-state-east-asian-and-pacific-affairs-david-r-stilwell.

[41] The full quote from Deng Xiaoping is 冷静观察, 稳住阵脚, 沉着应付, 韬光养晦, 善于守拙, 决不当头, 有所作为. *See* Stone & Wood, 2 (from the introductory letter by Brendan Mulvaney).

[42] From the early 1980s through the end of the first decade of the 21st century, study teams across Chinese academic institutions undertook research to map CNP, devise ways to measure CNP, and build theoretical models for both the pursuit and utilization of CNP. *See* Huang Shuofeng, *Comprehensive National Power Theory* （综合国力论）(China Academy of Social Sciences, 1992); Huang Shuofeng *Rivalries Between Major Powers: A Comparison of World Power's Comprehensive National Power* (大国转量：世界主要国家综合国力国际比较) (World Affairs Press, 2006); Wang Ling, "Measurements on Comprehensive National Power," *Ai Sixiang*, August 23, 2006, https://www.aisixiang.com/data/10799.html; Wu Chunqiu, *Chinese Grand Strategy: A Chinese View* (Military Science Publishing House, 1998); Wang Songfen, Chen Shao, & Shi Xiaoyu, eds., *Comparative Study of Comprehensive National Power of Major Countries in the World* (Hunan Publishing House, 1996).

[43] Huang *Rivalries Between Major Powers*, 31.

[44] Wu Chunqiu, *Grand Strategy Theory* (大战略论), Military Science Press, December, 1998, 62 (国力系统好比人体系统一样，每一个组成部分（包括生理和心里两个方面的）都是必不可少的，而却互相依存，互相影响，往往牵一发而动全身); *see also* Wu Chunqiu, *Grand Strategy: A Chinese View* (Military Science Press, 1998), 62.

[45] Huang, *Comprehensive National Power Theory*; Huang *Rivalries Between Major Powers*.

[46] Huang *Rivalries Between Major Powers*, 13.

[47] *See* Huang, *Comprehensive National Power Theory*; Huang *Rivalries Between Major Powers*; Wang Ling, "Measurements on Comprehensive National Power"; Wu, *Chinese Grand Strategy*; Wang et al., *Comparative Study of Comprehensive National Power of Major Countries in the World*.

[48] National Bureau of Statistics, "Li Qiang Presided Over the Final Review Meeting of the Project "Research on the Evaluation of Comprehensive National Power of Major Countries in the World," November, 14, 2014, http://www.nssc.stats.gov.cn/kydt/kykx/201411/t20141117+2005.html

[49] A wide body of literature was produced by all of these teams.

[50] The Rejuvenation Through Science and Technology Development Strategy, Sustainable Development Strategy, and Rejuvenation through Talent Development Strategy were all launched in the initial phase of the pursuit of CNP as a central national strategy from 1996-2002. After assessments that China had risen to the second most powerful country in the world by CNP measures, and new assessments of the national condition, the CCP from 2012-2017 launched an additional four national development strategies, the Innovation-Driven Development Strategy, the Rural Revitalization Development Strategy, the Regional Coordinated Development Strategy, and the Military-Civil Fusion Development Strategy.

[51] *See generally, e.g.*, Christopher A. Ford, "Nuclear Posture and Nuclear Posturing: A Conceptual Framework for Analyzing China's Nuclear Weapons Policy," National Institute for Public Policy *Occasional Papers*, vol. 4, no. 2, February 2024, 60 (observing that "the CNP concept … assumes that the possessor of the *most* CNP is essentially destined to prevail in the international arena, at least eventually. It also tends to assume that countries can be essentially *rank-ordered* in their amount of CNP, so that the world at any given time can be sorted into a fairly clear status-hierarchy from weakest to strongest. With superlative CNP, one thus sits at the top of the world- system, and acquires the role of lead norm-setter for that system."), https://nipp.org/wp-content/uploads/2024/02/Vol-4-No-2-final.pdf; *see also, e.g.*, Michael Pillsbury, *China Debates the Future Security Environment* (National Defense University Press, 2000), 203-58 (discussing CNP calculations by Chinese scholars, especially methodologies advanced in the 1990s by researchers at the Chinese Academy of Social Sciences and the Academy of Military Science). Many Chinese studies from the early 1990s to the end of the first decade of the 2000s measured comparative CNP around the world. *See* Huang *Rivalries Between Major Powers*; Wang et al., *Comparative Study of Comprehensive National Power of Major Countries in the World*.

[52] *See, e.g.*, Ford, *China Looks at the West*, 391-411.

[53] Yan Xuetong, *The Transfer of World Power: Political Leadership and Strategic Competition* (Peking University Press: September 2015). (The Kindle edition of this book does not include page numbers. Yan wrote: "今后十年，中国的大国地位和大国责任无法掩饰和回避，因此我国外交需强化敢当的意识").

[54] Yan Xuetong, "Political Leadership and Security in the Rise of Great Powers," *National Security Studies*, no. 4, (2016), 3 (根据道义现实主义原理，中国综合国力居世界第二位是中国指定崛起目标和政策战略的基础，符合国力技术的目标和战略就于成功，而超越实力基础的目标和战略则会削弱中国的实力.)

[55] Huang *Rivalries Between Major Powers*.

[56] Pillsbury, *China Debates the Future Security Environment*, xxii, xxxvii, & 256. It may also be that CNP thinking drew upon Soviet strategic traditions of thinking about the overall "correlation of forces" as a way of predicting the outcome of conflicts – or even also from the work of former U.S. Central Intelligence Agency official Ray Cline, whose "Modern Comprehensive National Power Equation" is frequently cited by Chinese CNP scholars as validating the essential concept. *See, e.g.*, Ma Gensheng, *Research on Military Soft Power* (*Junshi Ruan Shili Yanjiu*) (PLA Press [*Jiefangjun Chubanshe*], 2010).

[57] Sun Bin, *The Art of Warfare*, D.C. Lau & Roger T. Ames, trans. (State University of New York Press, 2003), ch. 16, 134-35 (recounting Sun Bin's advice to the King of Qi).

[58] Christopher A. Ford, "China's Strategic Vision: Part One – The Communist Party's Strategic Framing," MITRE Corporation *Occasional Papers*, vol. 1, no. 1, June 27, 2022, 3-4.

[59] Ford, *China Looks at the West*, 143.

[60] *See generally*, Ford, *The Mind of Empire*, 34-38.

[61] Herbert Fingarette, *Confucius – the Secular as Sacred* (Harper & Row, 1972), 62.

[62] *The Great Learning*, para. 5, in James Legge, trans., *Confucius: Confucian Analects, The Great Learning and the Doctrine of the Mean* (Clarendon: 1893), 357-58.

[63] *Analects*, bk. 2, chap. 1, in Legge, trans., *Confucius*, 145.

[64] Ford, *The Mind of Empire*, 33 (quoting *Doctrine of the Mean*, chap. 19(1)-(6), in Legge, trans., *Confucius*, 402-4).

[65] As Yuri Pines has recounted, the roots of "Mandate of Heaven" thinking lie in the Zhou Dynasty period (c.1046-256 B.C.E.) of ancient Chinese history, and especially the Spring and Autumn Period (c.770-c.481 B.C.E.). Over time, it came to be believed that if rulers departed from the way of virtue (*de*) – such as by not being benevolent, not caring for their people, or being otherwise unvirtuous – they might lose the favor of Heaven (*tian*). Losing the approval of "the supreme deity and the ultimate guardian of social order," they would hence lose their right to rule and be overthrown. Yuri Pines, *Foundations of Confucian Thought: Intellectual Life in the Chunqiu Period, 722-453 B.C.E.* (University of Hawai'i Press, 2002), 56-59, 62, 71, & 207.

[66] Rush Doshi, *The Long Game* (Oxford Univesity Press, 2021), 182 (quoting Xi from 2013).

[67] Christopher A. Ford, "China's Strategic Vision – Part 2: Tools and Axes of Competition," MITRE Center for Strategic Competition, *Occasional Papers*, vol. 1, no. 2, June 27, 2022, 2, https://irp.cdn-website.com/ce29b4c3/files/uploaded/China%27s%20Strategic%20Vision%20%28MITRE%29%20Part%20II.pdf.

[68] 14th Five-Year Plan, 3; *see also* Gu Huang, "Ancient Wilderness: Three Basic Points for Grasping the System Concept," *Theory Network*, December 7, 2020 ("At the Fifth Plenary Session of the 19th Central Committee of the Communist Party of China, the adherence to the system concept was clearly defined as one of the major principles that must be followed for economic and social development during the '14th Five-Year Plan' period …."), https://www.theorychina.org.cn/c/2020-12-07/1316526.shtml.

[69] 14th Five-Year Plan, 7. Traditional Chinese Medicine (TCM) is also given a special call-out in the Plan, it apparently being unacceptable for China to depend entirely upon medical concepts of Western origin. Ibid. 109.

[70] Gu, "Ancient Wilderness."

[71] 14th Five-Year Plan, 1.

[72] Ibid. 1 n.1 (translator's note).

[73] Ibid. 7 n.5 & 38 n.10 (translator's notes).

[74] *See, e.g.*, Wu Zhicheng, "Comprehensively promote major-country diplomacy with Chinese characteristics," *China Military Network / Ministry of Defense Network* (January 5, 2023) (discussing Xi speech of January 4, 2023).

[75] 14th Five-Year Plan, 3.

[76] *See* Liza Tobin, "Xi's Vision for Transforming Global Governance: A Strategic Challenge for Washington and Its Allies," *Texas National Security Review*, vol. 2, no. 1 (November 2018), 154-66, https://tnsr.org/2018/11/xis-vision-for-transforming-global-governance-a-strategic-challenge-for-washington-and-its-allies/#_ftnref2.

[77] Yang Jiechi, 求是 ["Seeking truth"], August 1, 2018 (quoted in Tobin, "Xi's Vision for Transforming Global Governance," http://www.qstheory.cn/dukan/qs/2018-08/01/c_1123209510.htm.

[78] Yang Jiechi, "Guided by Xi Jinping's diplomatic thought, deeply promote foreign work in the new era," *Seeking the Re*, August 1, 2018, http://www.qstheory.cn/dukan/qs/2018-08/01/c_1123209510.htm.

[79] Ayşe Zarakol, *After Defeat: How the East Learned to Live with the West* (Cambridge University Press, 2011), 9-10.

[80] Zhitian Luo, "China – History writing: linking the past and the future," *Histories of nations: How Their Identities Were Forged* (Peter Furtado, ed.) (Thames & Hudson, 2017), 52.

[81] *See, e.g.*, Osterhammel, *The Transformation of the World*, 794 (recounting that in late 19th Century China, "[t]he superiority of Western knowledge (*xixue*) in some domains was soon recognized, but there was an unwillingness to grant equal value to Western culture as such. The fact that aggressors and invaders were the bearers of the new knowledge, and that Christian missionaries in the forefront often behaved without the necessary tact, contributed o the general sense of mistrust. After 1860, small circles of Chinese opened up intellectually to the West, and the state established a number of translation bureaus. But a sterile counterposition of Chinese to Western knowledge became a dogma among the majority of literati in the second half of the nineteenth century. When after the turn of the century the mood shifted into one of acute national crisis, Chinee tradition came to be seen as deeply problematic. Elements of Western knowledge were imported as a matter of urgency (mainly via a grudgingly admired Japan); the Japanese educational system (or anyway some of its elements) was hastily adopted in a spirit of panic.").

[82] Larson & Shevchenko, *Quest for Status*, 80.

[83] Ibid., 74-76.

[84] Martin Jacques, "A Civilization-State," in *When China Rules the World* (Penguin, 2009), 243-44.

[85] Larson & Shevchenko, *Quest for Status*, 78.

[86] CCP officials, for instance, have long cultivated this memory, observing a "national humiliation day" and promoting ideas of the "'century of humiliation' (*bainian guochi*)." *See* Jing Tsu, *Failure, Nationalism, and Literature: The Making of Modern Chinese Identity, 1985-1937* (Stanford University Press, 2005), 223. In November 2012, Xi Jinping himself declared his commitment to achieving the "Chinese Dream" of the "great revival of the Chinese nation" while standing in front of an exhibit at the National Museum on the "century of humiliation." Larson & Shevchenko, *Quest for Status*, 211.

[87] *See* Christopher A. Ford, "Competitive Strategy in Information Competition," *Livermore Papers in Global Security*, no.11, December 2022, 21-22, https://cgsr.llnl.gov/sites/cgsr/files/2024-08/cgsr-livermore-paper-11-competitive-strategy-info-confrontation.pdf.

[88] Xu Shiyong & Wu Peiren, "Research and analysis of techniques to break the balance of the combat system," *China Military Network / Ministry of National Defense Network*, March 21, 2024, http://www.81.cn/szb_223187/szbxq/index.html?paperName=jfjb&paperDate=2024-03-21&paperNumber=07&articleid=927466.

[89] Robert Winder, *Soft Power: The New Great Game* (Abacus, 2020), 15 (quoting Okri).

[90] Xi Jinping, "*Hold High the Great Banner of Socialism with Chinese Characteristics and Work Together for the Comprehensive Construction of a Modern Socialist Country – Report at the 20th National Congress of the Communist Party of China,*" October 16, 2022, https://www.gov.cn/xinwen/2022-10/25/content_5721685.htm

[91] He Liang, "*Enhance China's International Discourse Power,*" *Qiushi*, September 9, 2019, https://www.qstheory.cn/dukan/hqwg/2019-09/09/c_1124968280.htm.

[92] "Decision of the CPC Central Committee on Further Deepening Reform and Promoting Chinese-style Modernization (Adopted at the Third Plenary Session of the 20th Central Committee of the Communist Party of China on July 18, 2024)," *Xinhua News Service*, July 18, 2024, https://www.gov.cn/zhengce/202407/content_6963770.htm

[93] "Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era and the Chinese Construction of Discourse Power," *Study Times* (as found on *Xinhua Net*, October 28, 2020, http://www.xinhuanet.com/politics/2020-10/28/c_1126666536.htm.

[94] Wang Shoulin, "Forming International Discourse Power that Matches My Country's Comprehensive National Power and International Status," *Guangming Wang* [official Web portal of the State-controlled *Guang Ming Daily*], December 8, 2021, https://theory.gmw.cn/2021-12/08/content_35366185.htm.

[95] Toni Friedman, "Lexicon: 'Discourse Power' or the 'Right to Speak': (话语权, Huàyǔ Quán)," *DigiChina* (Stanford University), March 17, 2022, https://digichina.stanford.edu/work/lexicon-discourse-power-or-the-right-to-speak-huayu-quan/.

[96] Friedman, "Lexicon: 'Discourse Power.'"

[97] Lu Wei, "National Discourse Power and Information Security Against the Background of Economic Globalization," *People's Daily*, July 2010, https://digichina.stanford.edu/work/national-discourse-power-and-information-security-against-the-background-of-economic-globalization/.

[98] *See, e.g.*, Page, *The Model Thinker*, 25.

[99] Huang *Rivalries Between Major Powers*, 18.

[100] *See, e.g.*, Henry Farrell & Abraham L. Newman, "Weaponized Interdependence: How Global Economic Networks Shape State Coercion," in *The Uses and Abuses of Weaponized Interdependence* (Daniel W. Drezner, Henry Farrell, & Abraham L. Newman, eds.) (Brookings Institution, 2021), 25-32.

[101] *See, e.g.*, Juan C. Zarate, *Treasury's War: The Unleashing of a New Era of Financial Warfare* (Public Affairs, 2013).

[102] Christopher A. Ford, "Weaponized Interdependence, U.S. Economic Statecraft, and Chinese Grand Strategy," remarks at Columbia University, February 8, 2024, https://www.newparadigmsforum.com/weaponized-interdependence-u-s-economic-statecraft-and-chinese-grand-strategy.

[103] *See, e.g.*, "Systems and Strategy," 3; Ford, "Weaponized Interdependence, U.S. Economic Statecraft, and Chinese Grand Strategy"; Christopher A. Ford, "Equipping Leaders for Strategic Competition Against China's 'Leverage Web,'" remarks at the Johns Hopkins University's Applied Physics Laboratory, July 18, 2024, https://www.newparadigmsforum.com/equipping-western-leaders-for-sustained-strategic-competition-against-communist-chinas-leverage-web-strategy.

[104] Christopher Ford & Alex Memory, "The Ties that Bind: A Data-Driven Analysis of Oceania's Dependency on China" (with Dr. Alex Memory), Defense & Strategic Studies Online [Missouri State University], vol. 1, no. 1, Autumn 2024, 25-26 ("To our eye, this [data] suggests the distinct possibility – though of course it does not yet "prove" the proposition – that the extraordinary consistency of China's increasing relational bandwidth with the rest of the world (Oceania included) and the rapidly increasing dependency of other countries upon China is no accident. Instead, this consistency might be the result of a deliberate and systematic *strategy* of enmeshing the rest of the world in 'leverage webs' that may be expected to expand the Chinese Communist Party's ability to influence and control other societies."), https://irp.cdn-website.com/ce29b4c3/files/uploaded/DASSO_Volume_1_Issue_1_Ford_and_Memory.pdf.

[105] Xi Jinping, "Let the Torch of Multilateralism Light up Humanity's Way Forward," remarks to the World Economic Forum, January 25, 2021, in Xi Jinping, *Speeches on Diplomacy*, vol. 2 (Central Compilation and Translation Press, 2022), 385.

[106] *See* U.S. Department of Defense, *Military and Security Developments Involving the People's Republic of China 2023* (October 2023), 23, https://media.defense.gov/2023/Oct/19/2003323409/-1/-1/1/2023-MILITARY-AND-SECURITY-DEVELOPMENTS-INVOLVING-THE-PEOPLES-REPUBLIC-OF-CHINA.PDF; *see also, e.g.*, Xi Jinping, "Together, Let Us Fight Covid-19 and Create a Better Future," remarks to the 15th G20 Leaders' Summit (November 21, 2020), in Xi Jinping, *Speeches on Diplomacy*, vol. 2 (Central Compilation and Translation Press, 2022), 369 (describing "domestic circulation as the mainstay" of dual circulation).

[107] Christopher A. Ford, "Call it by its Name: Communist Chinese Imperialism," National Institute for Public Policy *Occasional Papers*, vol. 4, no. 11 (November 2024), 67 (quoting National People's Congress, *Outline of the People's Republic of China 14th Five-Year Plan for National Economic and Social Development and Long- Range Objectives for 2035*, published by *Xinhua News Agency* (March 12, 2021), 7, https://cset.georgetown.edu/publication/china-14th-five-year-plan/ (Chinese source https://perma.cc/73AK-BUW2)), https://irp.cdn-website.com/ce29b4c3/files/uploaded/Ford_on_Chinese_Imperialism.pdf.

[108] Ford, "Xi Jinping, Michel Foucault, and Spy Balloons?," 18.

[109] Richard J. Smith, *Chinese Maps* (Oxford University Press, 1996), 7 & 9. Chinese assumed for many centuries, that the brilliance of their civilization had the power to absorb and transform the rude "barbarians" that surrounded it, so that "[t]he 'barbarians' who admired Chinese civilization … would eventually be transformed into Chinese." Tao Jin-Shen, "Barbarians or Northerners: Northern Sung Images of the Khitans," in *China Among Equals: The Middle Kingdom and its Neighbors, 10th-14th Centuries* (Morris Rossabi, ed.) (University of California Press, 1983), 66; *see also, e.g.*, Morris Rossabi, "Introduction," in Rossabi, ed., *China Among Equals*, 2 (noting that in ancient China's "unique system of foreign relations," foreign barbarians would eventually "naturally accept the superiority of the Chinese"); Nadège Rolland , "China's Vision of a New World Order," National Bureau of Asian Research Special Report, no. 83, January 2020, 33 (noting the ancient "sense of the superiority of the Chinese civilization (*huaxia*) over that of surrounding states," which were "expected to 'come and be transformed' by the superior culture of the central polity").

[110] *See, e.g.*, Smith, *Chinese Maps*, 9 (noting that even powerful conquering barbarians were described as "gravitating to China out of 'admiration for righteousness'."

[111] *See also* Katja Drinhausen & Helena Legarda, "Confident Paranoia: Xi's 'comprehensive national security' framework shapes China's behavior at home and abroad," *Merics China Monitor*, September 15, 2022, 18 (quoting Xi).

[112] One of the authors of this paper has also speculated that CNP theory may also be helping to drive China's current nuclear weapons build-up. *See* Christopher A. Ford, "Nuclear Posture and Nuclear Posturing: A Conceptual Framework for Analyzing China's Nuclear Weapons Policy," National Institute for Public Policy *Occasional Papers*, vol. 4, no. 2, February 2024, 61-62 ("If one believes CNP theory, and if one regards the possession of nuclear weapons as one of the (many) facets of national power, it is presumably all but inevitable to assume that in order to achieve the CNP-maximization required for the "China Dream," Beijing needs a large nuclear arsenal – one that is at *least* equal to that of any rival."), https://nipp.org/wp-content/uploads/2024/02/Vol-4-No-2-final.pdf.

[113] Cultural promotion has been a major focus of CCP "soft power" cultivation since the 1980s, and this began to receive even greater attention in the 1990s. *See generally, e.g.*, Martina Bassan, "China's Soft Power in Africa,'" in *Soft-Power Internationalism: Competing for Cultural Influence in the 21st-Century Global Order* (Burcu Baykurt & Victoria de Grazia, eds.) (Columbia University Press, 2021), 186; Zhongying Pang, "The Evolution of China's Soft-Power Quest from the Late 1980s to the 2010s,'" in Murcu & de Grazia, *Soft-Power Internationalism*, 201.

[114] Robert Winder, *Soft Power: The New Great Game* (London: Abacus, 2020), 299 (quoting Hu).

[115] Huang *Rivalries Between Major Powers*, 27. Many other Chinese scholars have written about the importance of cultural power as well.

[116] Winder, *Soft Power*, 300 (quoting Xi). Xi explained these requirements in his speech to the 20th Party Congress in 2022.

[117] 14th Five-Year Plan, 82.

[118] Ibid., 7, 7 n.5 (translator's note), & 38 n.10 (translator's note).

[119] For a discussion of Qian's career and evolving thinking, *see, e.g.*, Stone, "'A Complex Systems Engineering Undertaking,'" 10-25.

[120] King, "The Genealogy of Chinese Cybernetics."

[121] Stone, "'A Complex Systems Engineering Undertaking,'" 7 (citing "'Scientist with Distinguished Contribution to the Nation' Award Ceremony" ["国家杰出贡献科学家"], xjtu.edu.cn, accessed November 2021, http://www.lib.xjtu.edu.cn/lib75/qxs/shengp_dmt/photo13.htm).

[122] Stone, "'A Complex Systems Engineering Undertaking,'" v.

[123] Chin, Josh, Lin, Liza, "The American-Trained Rocket Scientists Who Shaped China's Surveillance System: An Excerpt from "Surveillance State: Inside China's Quest to Launch a New Era of Social Control," *China File,* 6 September, 2022, https://www.chinafile.com/library/excerpts/american-trained-rocket-scientist-who-shaped-chinas-surveillance-system.

[124] Hoffman, "Programming China," 3.

[125] Hoffman, "Programming China," 3.

[126] Chin & Lin, *Surveillance State*, 76-78.

[127] Brugger & Kelly, *Chinese Marxism in the Post-Mao Era*, 60 (quoting article published by Jin, Liu, and Fa in *Wenti yu fangfa ji*).

[128] King, "The Genealogy of Chinese Cybernetics."

[129] Huang *Rivalries Between Major Powers*, 31; *see also* Wang Ling, "Measurements on Comprehensive National Power."

[130] King, "The Genealogy of Chinese Cybernetics."

[131] Hoffman, "Programming China," 3-4.

[132] King, "The Genealogy of Chinese Cybernetics."

[133] *See generally* Chin & Lin, *Surveillance State*, 1-66, 114–27, & 215-31.

[134] *See generally, e.g.,* Katie Canales & Aaron Mok, "China's 'Social Credit' System Ranks Citizens and Punishes Them with Throttled Internet Speeds and Flight Bans if the Communist Party Deems Them Untrustworthy," *Business Insider*, November 28, 2022, https://www.businessinsider.com/china-social-credit-system-punishments-and-rewards-explained-2018-4.

[135] Hoffman, "Programming China," 2.

[136] Ibid., 2.

[137] Stone, "'A Complex Systems Engineering Undertaking,'" 25. Some scholars have also pointed out that "systems thinking as a mode of inquiry mirrors ancient Chinese philosophical works from over 2,000 years ago. They note that holistic, integrative, and systems thinking permeates ancient writings such as the *I Ching*, the Taoist classic *Tao Te Ching*, and the *Art of War*, as well as the practice of traditional Chinese medicine." Ibid., 26.

[138] Brugger & Kelly, *Chinese Marxism in the Post-Mao Era*, 5 & 12.

[139] Ibid., 35.

[140] Brugger & Kelly, *Chinese Marxism in the Post-Mao Era*, 40, 44-45, 57-59, 62-64, & 68. The influence of Prirogine, for instance, can be seen in the discussion of "open" versus "closed" complex systems by a Chinese writer by the name of Gu Huang. Gu, "Ancient Wilderness."

[141] Ibid., 37.

[142] Ibid., 52.

[143] Ibid., 45.

[144] Ibid., 35.

[145] Chen Baihong, "Adhere to system integration and collaborative cooperation," *China Military Network / Ministry of National Defense Network*, January 8, 2025, http://www.81.cn/szb_223187/szbxq/index.html?paperName=jfjb&paperDate=2025-01-08&paperNumber=03&articleid=947112.

[146] Baihong, "Adhere to system integration and collaborative cooperation." Qian, in fact, saw such social engineering as a special advantage of China's under the rule of the CCP. "According to Qian, development in

a socialist country comes with its own unique set of challenges and opportunities, with one of the most important opportunities being its ability to design and implement long-term development plans. With help from social engineering, he suggested, China's political system was well-positioned to carry out long-term planning on a national scale and ensure its long-term success. By contrast, he contended that applying SE to long-term state-level planning simply 'cannot be done' in capitalist countries despite the fact that SE is widely adopted in commercial enterprises in their systems." Stone, "'A Complex Systems Engineering Undertaking,'" 29.

147 Stone, "'A Complex Systems Engineering Undertaking,'" 33 (quoting Wei Hongsen [魏宏森], "Qian Xuesen's Initial Framework for Constructing a Systems Theory" [钱学森构建系统论的基本设想], *Journal of Systems Science* 21 no.1, February 2013, 6; & Yu Jingyuan, "Qian's Xuesen Framework of Modern Science and Technology and Meta-synthesis," [钱学森的现代科学技术体系与综合集 成方法论], *Journal of Communication and Transportation Systems Engineering and Information* 1 no. 4, November 2001, 274).

148 Stone, "'A Complex Systems Engineering Undertaking,'" 38.

149 King, "The Genealogy of Chinese Cybernetics."

150 Ford, "Xi Jinping, Michel Foucault, and Spy Balloons?" 44.

151 Stone, "'A Complex Systems Engineering Undertaking,'" 29-30.

152 Drinhausen & Legarda, "Confident Paranoia," 13.

153 The Chinese phrase 总体国家安 can be translated as "comprehensive national security" or "overall national security." An even better translation might be "holistic national security" in order to avoid any possible confusion with the CNP concept. We opt to use "comprehensive national security" here for convenience, however, because it is used in the title of the article on this topic by Katha Drinhausen and Helena Legarda.

154 Ibid., 2 & 4.

155 Iblid., 5.

156 Ibid., 5.

157 Yan Zhang, "Security Innovation Seen as Crucial," *China Daily*, September 20, 2017, http://www.chinadaily.com.cn/china/2017-09/20/content_32225951.htm.

158 Hoffman, "Programming China," 6.

159 Stone, "'A Complex Systems Engineering Undertaking,'" 28 (*citing* Qian Xuesen [钱学森] and Wu Jiapei [乌家培], "Social Engineering—A Technique for Organizing and Managing Socialist Construction" [组 织管理社会主义建设的技术——社会工程], *Economic Management* [经济管理], 1 (1979) http://www.lib.xjtu.edu.cn/lib75/qxs/lxtgch/28.html).

160 Stone, "'A Complex Systems Engineering Undertaking,'" 31 (quoting Qian Xuesen, Yu Jingyuan, and Dai Ruwei, "A New Discipline of Science—The Study of Open Complex Giant System and Its Methodology," *Chinese Journal of Systems Engineering and Electronics* 4, no 2, 1993, 2-12).

161 Stone, "'A Complex Systems Engineering Undertaking,'" 16.

162 Ibid., 1.

163 Ibid., 18 (quoting Qian Xuesen, "The Overall Design Department for the Socialist Construction—the Advisory Body to the Party and the State" [社会主义建设 的总体设计部—党和国家的咨询服务工作单位], delivered on 15 May 1987 as part of the Wu Yuzhang Academic Lecture Series; and Jiang Zemin's main contribution and basic experience in advancing the great new project of party building" [江泽民推进党的建设新的伟大 工程的主要贡献与基本经验], Institute of Party History and Documentation of the Central Committee of the Communist Party of China, 6 February 2015, http://www.dswxyjy.org.cn/n1/2019/0228/c423720-30923346.html).

[164] Stone, "'A Complex Systems Engineering Undertaking,'" 8 (quoting "Qian Xuesen's Descendant Said This When He Passed by Tiananmen Square ....." [钱学森后代坐礼宾车经过天安门时说.....], China Space News Public Account, 17 October 2019, https://www.thepaper.cn/newsDetail_forward_4700113).

[165] Stone, "'A Complex Systems Engineering Undertaking,'" 18 (quoting Qian Xuesen, "The Overall Design Department for the Socialist Construction—the Advisory Body to the Party and the State" [社会主义建设 的总体设计部—党和国家的咨询服务工作单位], delivered on 15 May 1987 as part of the Wu Yuzhang Academic Lecture Series; and Jiang Zemin's main contribution and basic experience in advancing the great new project of party building" [江泽民推进党的建设新的伟大 工程的主要贡献与基本经验], Institute of Party History and Documentation of the Central Committee of the Communist Party of China, 6 February 2015, http://www.dswxyjy.org.cn/n1/2019/0228/c423720-30923346.html).

[166] Stone, "'A Complex Systems Engineering Undertaking,'" 2.

[167] Ibid., 6 (quoting "Xi Jinping: Comprehensively Deepening Reform is a Complex Systems Engineering Undertaking" [习近平:全面深化改革是一项复杂的系 统工程], *Xinhua*, 13 November 2011, http://www.xinhuanet.com//politics/2013-11/13/c_118130505.htm).

[168] Stone, "'A Complex Systems Engineering Undertaking,'" 1, 6, & 40-41.

[169] Ford, "Xi Jinping, Michel Foucault, and Spy Balloons?" 45.

[170] Hoffman, "Programming China," 4-5.

[171] Ford, "Xi Jinping, Michel Foucault, and Spy Balloons?" 5.

[172] Rahul Karan Reddy, "Digital Silk Road," *ORCAsia*, February 8, 2023, https://www.orcasia.org/digital-silk-road.

[173] Jonathan E. Hillman, *The Emperor's New Road: China and the Project of the Century* (Yale University Press, 2020), 191.

[174] Ford, "Call it by its Name," 51.

[175] Hillman, *The Emperor's New Road*, 187.

[176] *See, e.g.*, Elizabeth C. Economy, *The World According to China* (Polity Press, 2022), 111.

[177] *See, e.g.*, Li Zhanliang, "Build a strong data foundation for winning wars," *China Military Network / Ministry of Defense Network* (December 15, 2022) (To some extent, whoever has the advantage of data may be more likely to win the war with ease. … In the era of informationized and intelligent warfare, data has become an important factor in determining the outcome of the battlefield. With the transformation of combat methods, military data has become an important strategic resource. 'Data warfare' has gradually emerged as a brand-new combat style."); Tang Wei Kuang Dong, "Using big data to penetrate the 'fog of war,'" *China Military Network / Ministry of National Defense Network* (October 8, 2024) (arguing that "the 'explosive' growth of modern combat data and information, the confusion of true and false information, and the difficulty in identifying and processing have created a new 'information fog' (信息迷雾), affecting the commander's judgment and decision-making. The widespread application of big data technology can assist commanders in real-time processing and intelligent analysis of massive data information obtained from multiple sources, and deeply explore valuable intelligence information, thereby clearing the 'fog of war' …") http://www.81.cn/szb_223187/szbxq/index.html?paperName=jfjb&paperDate=2024-10-08&paperNumber=07&articleid=940721.

[178] Chen Baihong, "Adhere to system integration and collaborative cooperation," *China Military Network / Ministry of National Defense Network*, January 8, 2025, http://www.81.cn/szb_223187/szbxq/index.html?paperName=jfjb&paperDate=2025-01-08&paperNumber=03&articleid=947112.

[179] *See, e.g.*, Li Guanqian, "How to understand that data is a new production factor," *Communist Party of China News Network*, December 20, 2022 ("数据作为新型生产要素，是数字化、网络化、智能化的基础，已快速融入生产、分配、流通

、消费和社会服务管理等各个环节，深刻改变着生产方式、生活方式和社会治理方式," or "As a new production factor, data is the foundation of digitalization, networking and intelligence. It has been rapidly integrated into various links such as production, distribution, circulation, consumption and social service management, profoundly changing the mode of production, lifestyle and social governance."), http://theory.people.com.cn/n1/2022/1220/c40531-32590134.html; National Development and Reform Commission of the People's Republic of China, "The connotation characteristics and development priorities of new qualitative productive forces (in-depth study and implementation of Xi Jinping's Thought on Socialism with Chinese Characteristics for a New Era, March 1, 2024 ("…[D]ata, as a new type of production factor, has become an important labor object, which not only directly creates social value, but also further amplifies the value creation effect through the combination and integration with other factors of production."), https://www.ndrc.gov.cn/wsdwhfz/202403/t20240301_1364322.html.

180 Brugger & Kelly, *Chinese Marxism in the Post-Mao Era*, 35.

181 Ibid., 35 (emphasis added).

182 Ibid., 39.

183 Brian Castellani & Frederic Hafferty, *Sociology and Complexity Science* (Springer-Verlag, 2009), 17 & 24-25.

184 State Council of the People's Republic of China, Central Committee of the Chinese Communist Party, "Opinion of the Central Committee and the State Council on Building a Data Basic System to Better Play the Role of Data Elements," *Xinhua Press*, December 19, 2022, https://www.gov.cn/zhengce/2022-12/19/content_5732695.htm.

185 Ibid.

186 *See, e.g.*, Ibid.

187 "The Central Committee of the Communist Party of China and the State Council issued the 'Outline for Building a Powerful Country with Quality,' *People's Daily* (February 7, 2023), http://politics.people.com.cn/n1/2023/0207/c1001-32618749.html.

188 Ibid.

189 Ibid.

190 Christopher A. Ford & Thomas D. Grant, "Exporting Censorship: The Chinese Communist Party Tries to Control Global Speech About China," National Security Institute *Law and Policy Paper*, March 2022, 4, https://nationalsecurity.gmu.edu/wp-content/uploads/2022/04/Exporting-Censorship-FINAL-WEB-2.pdf.

191 Drinhausen & Legarda, "Confident Paranoia," 14.

192 Mark Galeotti, *The Weaponization of Everything* (Yale University Press, 2022), 88.

193 Galeotti, *The Weaponization of Everything*, 92.

194 Drinhausen & Legarda, "Confident Paranoia," 6 & 10.

195 Galeotti, *The Weaponization of Everything*, 92.

196 Ibid., 94-95.

197 Ford, "Xi Jinping, Michel Foucault, and Spy Balloons?," 49-51 (citing as illustrations: Shunsuke Tabeta, "Beijing Slams 7-Eleven for Labeling Taiwan a Country on Website," *Nikkei Asia*, January 7, 2022, https://asia.nikkei.com/Business/Retail/Beijing-slams-7-Eleven-for-labeling-Taiwan-a-country-on-website; Daniel Victor, "John Cena Apologizes to China for Calling Taiwan a Country," *New York Times*, May 25, 2021, https://www.nytimes.com/2021/05/25/world/asia/john-cena-taiwan-apology.html; James A. Millward, "Being Blacklisted by China, and What can be Learned from it," *Medium*, December 28, 2017, https://jimmillward.medium.com/being-blacklisted-by-china-and-what-can-be-learned-from-it-faf05eb8e1e2; Taylor Shortal, "Hollywood's Red Dawn: China's Restrictions on American Film," *Business*

Entrepreneurship & Tax Law Review, vol. 2, 2018, 209-09; Daniel Hurst, "China's Infamous List of Grievances with Australia 'Should be Longer than 14 Points,' Top Diplomat Says," *The Guardian*, November 19, 2021, https://www.theguardian.com/australia-news/2021/nov/20/chinas-infamous-list-of-grievances-with-australia-should-be-longer-than-14-points-top-diplomat-says; "China Lodges Protest with Japan Over New Textbooks," *Reuters* (March 22, 2016), https://www.reuters.com/article/us-china-japan-education/china-lodges-protest-with-japan-over-new-text-books-idUSKCN0WO0RP; Lawrence Chung, "Lithuania Defies Beijing's Anger and Names New Envoy to Taiwan," *South China Morning Post*, August 18, 2022, https://www.scmp.com/news/china/diplomacy/article/3189386/lithuania-defies-beijings-anger-and-names-new-envoy-taiwan.

198 *See generally, e.g.*, Ford, *China Looks at the West*, 449-55.

199 Ford & Grant, "Exporting Censorship," 5 (quoting Anna Mitchell & Larry Diamond, "China's Surveillance State Should Scare Everyone," *The Atlantic*, February 2, 2018), https://www.theatlantic.com/international/archive/2018/02/china-surveillance/552203/).

200 Galeotti, *The Weaponization of Everything*, 97.

201 Gu, "Ancient Wilderness."

202 Economy, *The World According to China*, 138.

203 Ford & Memory, "The Ties that Bind," 25-26 (suggesting, on the basis of mathematical analysis of China's trade, financial, and other relational data with foreign countries, the possibility that "the extraordinary consistency of China's increasing relational bandwidth with the rest of the world … and the rapidly increasing dependency of other countries upon China is no accident. Instead, this consistency might be the result of a deliberate and systematic *strategy* of enmeshing the rest of the world in 'leverage webs' that may be expected to expand the Chinese Communist Party's ability to influence and control other societies").

204 Ford, "Systems and Strategy," 3.

205 Department of Defense, *Military and Security Developments Involving the People's Republic of China 2023*, 31.

206 *See, e.g.*, Huang Ming & Mei Changwei, "Forge a rock-solid military-government military-civilian unity – Summary of the innovation and development of the work of supporting the army, superior subordinates, supporting the government and loving the people in the new era," *Xinhua News Agency*, January 11, 2023.

207 Stone & Wood, "China's Military-Civil Fusion Strategy," 44 (citing "Xi Jinping Chairs Second Plenary Meeting of the Central Commission for Military-Civil Fusion Development" [习近平主持召开中央军民融合发展委员会第二次全体会议], *Xinhua*, September 22, 2017, http://www.gov.cn/xinwen/2017-09/22/content_5226942.htm). As Stone and Wood note, "[f]rom Chinese writings, it is clear that MCF is not a simple addition to China's other national strategic priorities, but rather a strategy whose components are to be woven into China's system of national strategies to form an organic, powerful, and comprehensive national strategic system that will advance the PRC's overarching security and development goals." Stone & Wood, "China's Military-Civil Fusion Strategy," 8.

208 Linette Lopez, "It's official: The era of China's global dominance is over," *Business Insider*, October 16, 2023.

209 Yang Zhimou, "Combat planning from the perspective of complexity," *China Military Network / Ministry of National Defense Network*, February 8, 2024, http://www.81.cn/szb_223187/szbxq/index.html?paperName=jfjb&paperDate=2024-02-08&paperNumber=07&articleid=925073. PLA strategists have in recent years seem to be trying to apply cybernetically-derived approaches to war planning. Their conceptions of "intelligentized warfare" reflect this, with one recent discussion arguing, for instance, for an approach to "dissipative warfare" in which "the intelligentized warfare system achieves comprehensive combat power through the unity of the consumption of (amassed) material, the (scattered or dispersed) release of energy, and the diffusion of information by means of enrichment and synthesis internally, and the emergence of (a large number of) mutations (or sudden changes) externally." From "a philosophical point of view," Wang contends, "matter, energy, and information are the three major elements that make up the world, (where) matter (material) embodies the

existence of origin, energy embodies the existence of movement, and information embodies the existence of connection, (so that) the three progressively and alternately dominate the evolution and operation of social forms and war forms. … Therefore, in essence, dissipative warfare is an intelligent (key) element that highly unifies the characteristics and advantages of matter, energy, and information from the previous low-level warfare forms, and highly integrates the forms of material consumption, energy release, and information diffusion that are ubiquitous in warfare and, taken together, it reflects the typical characteristics of intelligentized warfare." Wang Ronghui, "Dissipative Warfare: A Typical Mode of Intelligentized (智能化) Warfare," *China Military Network / Ministry of Defense Network*, May 9, 2023, http://www.81.cn/szb_223187/szbxq/index.html?paperName=jfjb&paperDate=2023-05-09&paperNumber=07&articleid=905208. Whether or not such airy jargon actually represents a viable practical approach to improved warfighting will be left to the reader to ponder, but the "complexity science" tone and tenor of Chinese strategic writing is certainly quite pronounced. The connections between such ideas and "comprehensive national power" are also clear to see. Wang argues, for example, that dissipative warfare "is manifested in the synthesized confrontation between the physical domain, the information domain and the cognitive domain in the age of intelligentization, it is manifested in a high degree of unity in the form of political contests, economic competitions, military offensive and defensive (actions), cultural conflicts, and diplomatic checks and balances, [and] reflects the openness, complexity and emergence of the intelligentized warfare system."

210 Stone & Wood, "China's Military-Civil Fusion Strategy," 18.

211 *See e.g.*, Ford, "Call it by its Name"; Shin-Hwa Lee, "The Theory and Reality of Soft Power: Practical Approaches in East Asia," *Public Diplomacy and Soft Power in East Asia* (Sook Jong Lee & Jan Melissen, eds.) (Palgrave MacMillan, 2011) 25-26; Hillman, *The Emperor's New Road*, 209.

Small Modular Nuclear Reactors: Securing American Military Energy in an Era of Vulnerability and Growing Demand

by

Paul Schecklman

Introduction

American military installations are dependent upon an aging, vulnerable civilian grid to perform critical functions. The evolving nature of warfare is placing a higher dependency upon electricity for weapons, vehicles, and advanced computing systems at a time when electricity demand in civilian spheres is expected to grow quickly. This essay discusses the role nuclear energy and Small Modular Reactors (SMRs) can – and, I argue, should – play in enhancing resiliency and servicemember safety, and in reducing emissions while allowing military power generation to keep pace with the demands of modern warfare.

Additionally, I will discuss the potential SMRs can have in expanding American soft-power tools, for such transportable and flexible non-fossil-fuel electricity-generation options also offer great potential in the context of humanitarian and disaster relief operations. Thereafter, I will discuss the vulnerability of the electric grid as a reason to place energy production and transmission to and on U.S. military installations under the purview of the U.S. Department of Defense (DOD) in order to enhance deterrence and credibility while reducing the likelihood of an adversary attacking civilian resources. Finally, I will conclude by describing the role the Pentagon and federal stakeholders should play in ensuring that SMR development continues and that the products of such research and development efforts meet the needs of our national security apparatus.

Background

A sure and abundant supply of energy is a critical enabling component for military operations, and the demand for electrical energy within the U.S. defense establishment is only rising.[1] Ensuring the security and reliability of such a supply, however, represents a complex problem, involving challenges in sourcing, transportation, and grid network vulnerabilities, even as American troops operate around the globe in a wide array of environments under greatly varying conditions and with complex logistics.

Under the Biden Administration, the DOD was pursuing the goal of becoming carbon-neutral by 2050, a measure adopted in hopes of helping address climate change. While climate change may remain a factor in reevaluating traditional energy sourcing for military operations, however, the Department still has important reasons to focus upon these issues despite the Second Trump Administration's apparent downgrading of addressing climate change as a policy priority.

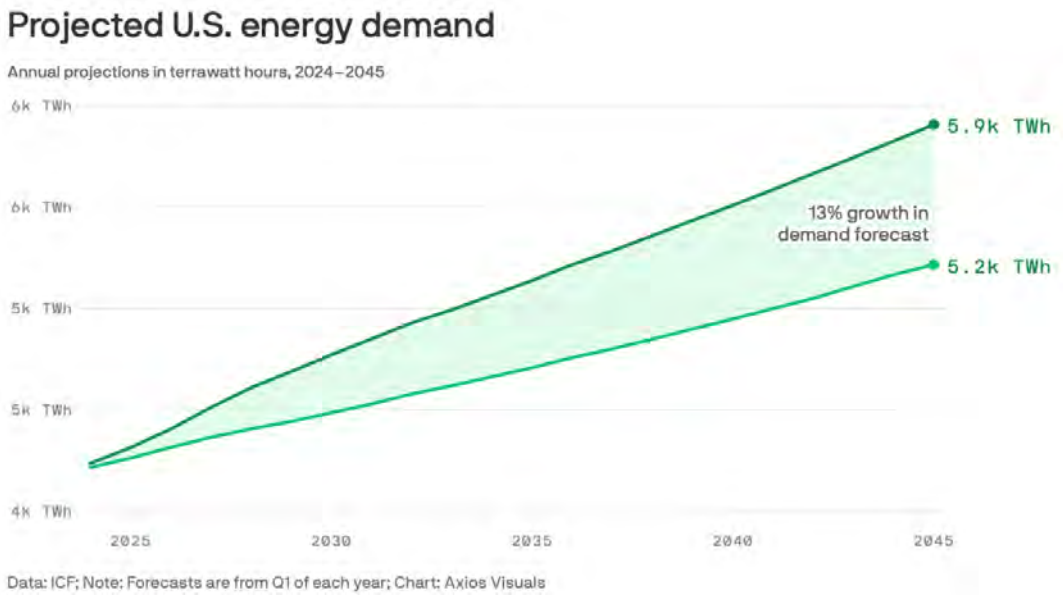
In fact, the DOD today has an opportunity to gain a significant strategic advantage from leveraging nontraditional sources of electric power. Specifically, President Trump's current administration has focused upon American energy dominance and upon achieving deterrence and peace through strength – with a particularly emphasis upon the strength of the U.S. military. The development of small modular reactors and other advanced nuclear reactors, followed by their deployment in support of DOD operations, has the potential to increase resiliency, improve servicemember safety, augment American "soft power," and help meet the growing power demands of new weapon systems.

Today's electrification wave spans all aspects of American life, including military operations. Personal increases in electrical demand stem from the growing prevalence of "smart" homes and vehicles. Commercial power use is increasing with the modern expansion of data centers and artificial intelligence (AI) programs, with electric

energy availability (for computation) emerging as a limiting factor in AI development. For its part, the military also needs abundant power for new warfighting tools and weapons.

Even while the United States and other countries have sought to reduce carbon emissions in recent years, stress has been growing on electric grids – grids that also power our military bases. This is increasingly understood to be a national security concern. The 2022 National Defense Authorization Act (NDAA) required the DOD to submit a formal plan to reduce emissions,[2] increasing its reliance upon electricity and energy-efficiency tools. The Biden Administration's 2022 National Security Strategy described climate change as an existential threat to Americans and the world, posing challenges to food, water, health, infrastructure, and security.[3] In response to these policy demands, DOD shifted resources and focus to meet requirements, trying to reduce its fossil fuel and electric energy consumption.

As stresses also grow upon civilian grids, however, the DOD must not allow U.S. military operations to be curtailed, fragmented, or otherwise made vulnerable as a result of energy restrictions – including by forcing them to rely upon expensive and inconsistent renewables such as wind, solar, and battery sources. In January of 2025, President Trump announced a historic investment into AI infrastructure that includes both virtual and hardware investments. This investment focuses not only on the software needs, but the production of data centers, facilities, and computer chips. As both the civilian economy and the U.S. armed services rely increasingly upon computerized systems, DOD activities will require ever larger amounts of reliable energy. To date, however, the government and military have not taken serious steps to address these challenges. As energy demand in America grows, energy availability will be an increasing problem for the DOD.



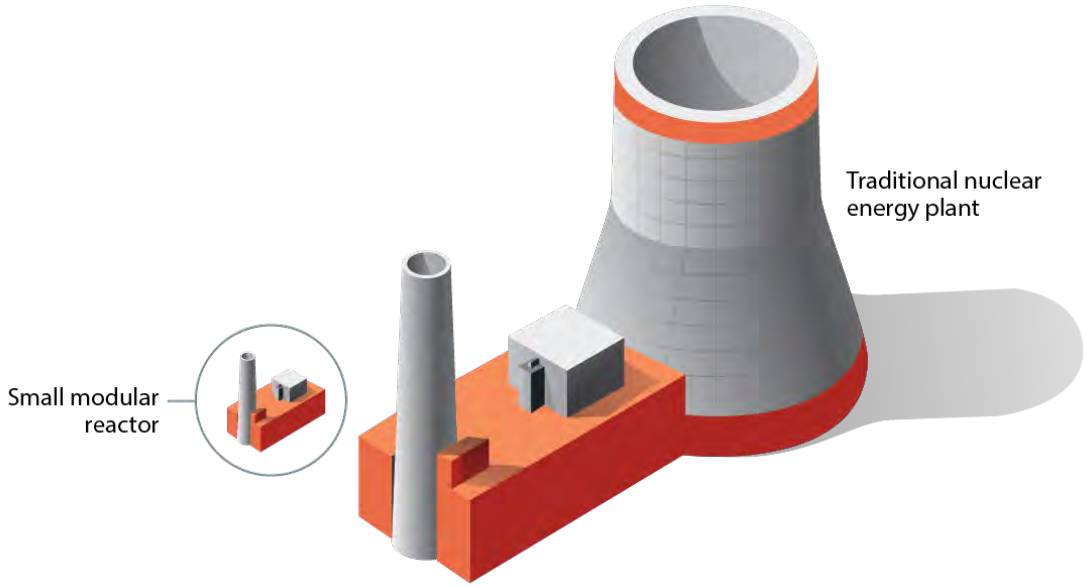
The DOD is already a significant customer of American energy. Currently, the U.S. military manages over 284,000 buildings and facilities that are deemed to be critical to mission assurance.[4] Mission assurance, moreover, can be complex and fragile. The energy systems that power our installations and DOD facilities are directly tied to keeping our nation safe and secure.[5]

At present, however, the U.S. electrical grid is too fragile for the DOD to rely upon – not to mentioned being an attractive target for cyber disruption by America's adversaries. The North American Electric Reliability Corp has warned of elevated risks of blackouts across the country while numerous national security community members have assessed the grid to be unreliable.[6] The U.S. power grid is highly complex, with over 3,000 utility companies working together to deliver power through hundreds of thousands of miles of transmission lines and 55,000 substations.[7] To further complicate matters, the grid and its energy services are outside the purview of the DOD for its continental bases, which means that they and their critical operations are subject to the same outages as civilian consumers, with inherently limited and temporary emergency capabilities for on-site backup generator power.

At present, roughly 6.5 percent of electricity the DOD consumes comes from renewables. Wind and solar have some utility, but are often limited by location, weather, time of year, storage capacity, and available land or constructability.[8] Additionally, solar installations and wind farms are also both fragile and highly visible targets for enemies. Furthermore, much of the storage and transmission components for solar and wind power are sourced from our primary adversary. (China is now the world's top supplier of advanced grid components and lithium batteries.) Together, these represent a significant cyber vulnerability.

As noted, the U.S. electric power grid has long been considered a logical target for a major cyberattack.[9] Then-FBI Director Christopher Wray warned of such threats in 2024, specifically from the People's Republic of China (PRC). Vulnerabilities exist through multiple points of entry of our electrical grid, which could allow attackers to exploit and access system networks.[10] And indeed the American grid has indeed already been exploited in the past by both adversaries and "hacktivists" (those breaking into systems for social or political reasons);[11] it will surely remain a target in the future.

Solar and wind power sourcing cannot adequately meet the energy demands of the DOD,[12] especially in time of crisis or war – that is, exactly when we would *need* to rely upon DOD most. The American grid, which supplies military assets on the continental United States, is too fragile, overloaded, and subject to cyber and other forms of attacks. While most bases do have backup power that can sometimes function for a few days, military assets taken offline in response to power outages would be unavailable to both domestic and international operations, and on-site supplies of diesel fuel are unavoidably finite. While energy efficiency measures can help, decreased consumption cannot meet the goal of insulating these bases from energy risk.[13] The only available technology that can meet the needs of the DOD and increase U.S. energy security, I submit, is nuclear power[14] – especially in the form of new "microgrids" fueled by modular nuclear reactors.



SMR comparison courtesy of Idaho National Laboratory

Small Modular Reactors

Nuclear energy capabilities are the "all the above" option to meet DOD needs[15] and are not new a new concept the United States military. The U.S. Navy is well known for its use of nuclear energy production on ships and submarines. For the past 70 years, the Naval Nuclear Propulsion Program has operated over 500 reactor cores, with 98 in service today,[16] while never experiencing an accident. From 1954 to 1977, the U.S. Army Nuclear Power Program also operated eight reactors, five of which were portable.[17]

Recent technological advances and signals from the commercial market have spurred a renewed investment into nuclear energy production with a variety of sizes and capabilities. Large, conventional reactors already provide robust energy solutions for civilian grids. However, Small Modular Reactors (SMRs) can provide the DOD the opportunity to right-size energy production to its energy requirements. DOD interest in SMRs originated from two vulnerabilities outlined in a decade-old report: dependence of U.S. military bases on fragile civilian grids, and the challenge of safely and reliably supplying energy to service members in forward operating locations.[18]

SMRs can generate roughly one-third the capacity of traditional reactors but their smaller footprint can be sited on locations not suitable for large plants.[19] Moreover, they can be built in waves, or incrementally, to match the changing needs of an installation. SMRs weigh 20-40 tons, can be transported by truck or plane, and can be installed in under 72 hours.[20] More importantly, they can safely, efficiently, and cleanly power military bases entirely independently of any public grids vulnerable to attack or outage.

Currently, for instance, the DOD is pursuing a pilot program in SMR technology called "Project Pele." This reactor model is designed to be resilient to external hazards such as weather and kinetic attack, and resilient against nuclear weapons proliferation in unauthorized hands.[21] (Members of the National Guard and Army Corps of Engineers will be charged with assembling, moving, and operating the reactor.) A decade in the making, the Project Pele reactor is not intended for forward use on the battlefield.[22] It is well-secured and utilizes spent fuel or low-enriched uranium, making it less likely to cause proliferation because such material would require further enrichment in order to be usable in a nuclear weapon.

While the DOD should be commended for moving forward with a potentially critical program, however, regulatory timelines and costs for licensing are still causing uncertainty.[23] Despite the U.S. having operated modular nuclear reactors in the past, and the Navy's resounding success in nuclear propulsion, the regulatory process in this industry can require up to 15 years for approvals, construction, and completion.[24] Under its new leadership, the DOD should focus on streamlining operations to ensure opportunity for key strategic advantages are not missed.

The U.S. is not alone in this quest. France, China, South Korea, and Russia are all pursuing similar technology. In fact, China is currently developing 16 non-naval SMR-type power reactor designs and Russia four, while the U.S. is producing only one.[25] If the DOD and U.S. government fail to lead (or at least to keep up) in this sector, we risk the standards being set by adversaries and the industry being largely controlled overseas, not to mention our failing to ensure

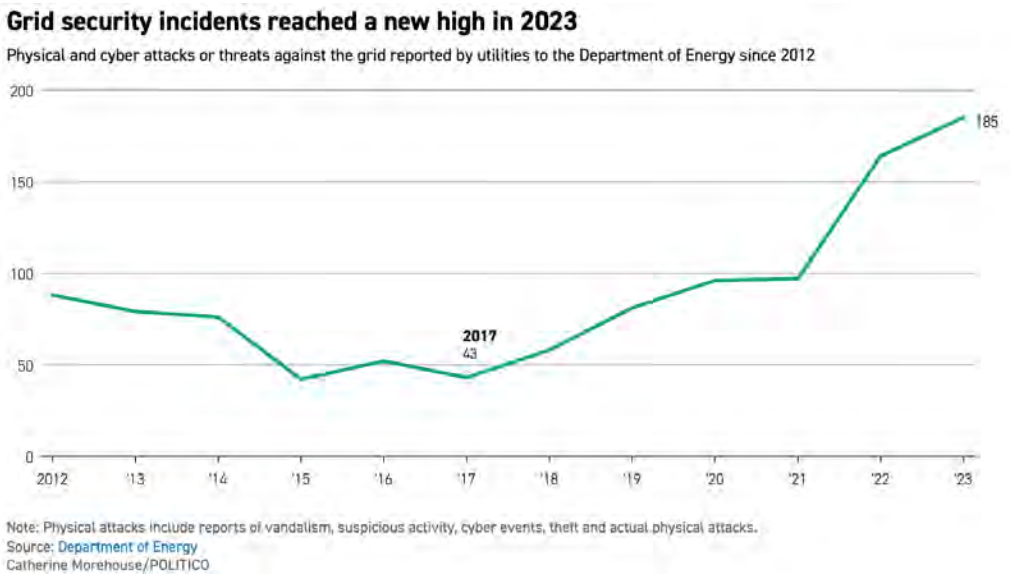
adequate power sourcing for U.S. military installations. Foreign domination of this arena would mean that designs might not be optimal for U.S. military applications – or that foreign suppliers might prohibit sales to U.S. military end-users – and that expertise will be dominated by foreign companies.[26] The DOD is on the right track with Project Pele, but its programs should expand to include not just SMRs but also very-small modular reactors (vSMRs) for use on forward, remote, or expeditionary bases, as well as larger modular reactors for permanent, large military bases in the United States.

Resiliency

The threats facing the U.S. military are substantial. Moreover, the number of military installations that are tied to civilian critical infrastructure creates not only direct vulnerabilities for the DOD, but may also place civilians at risk as a sort of "collateral damage" if and when adversaries seek to impede operations at military facilities by crashing U.S. civilian grids.[27] Adversaries such as Russia, China, Iran, and North Korea seem to view U.S. electrical grid vulnerabilities as offering them a potential asymmetric advantage in time of crisis or conflict, and they have offensive cyber and other capabilities that could be used against those grids. They might, for instance, calculate that a war of critical infrastructure attacks would impede us more than it would impede them, that we would be unwilling to attack *their* civilian electric grids in response, or simply that causing domestic confusion and disruption in the United States is their best way to hobble U.S. military mobilization against them overseas. Attacks on American critical infrastructure might be felt likely to discredit the U.S. Government, distract the public and military from military operations, or simply represent an easy means of retaliation.[28] Removing DOD installations from the public grid would thus lessen the national security impact of such disruptions if they were to occur, and would help protect American civilians from being caught up in such problems by reducing the incentive for an opponent to attack civilian electricity sources in the first place.[29]

Enhancing electrical resiliency for military operations might also contribute not merely to disincentivizing adversary aggression against

U.S. civilian infrastructure, but also to *deterring* it. By removing military functions from the civilian grid, the United States would be signaling to adversaries that hampering U.S. civilian grids would thereafter be viewed as a direct attack on American civilians that has no military rationale – and hence as a dramatic escalation, even a war crime. Additionally, building a capable energy resource for DOD facilities that has robust cyber defenses would make clear that any adversary that did attack the U.S. civilian grid would face an American military unimpeded by any loss of electrical power at its most important facilities. The U.S. would thus be in better position to "deter by denial" (because grid attacks would be less effective in achieving their goals) as well as to "deter by punishment" (because civilian grid attacks would elicit a more effective military response).



Servicemember Safety

SMR-based electric power security for DOD installations would have an additional benefit as well. American military assets and servicemembers are today deployed in a variety of distant and frequently austere environments. Our ability to project force globally is a unique and decisive advantage for the United States.[30] This ability is not without risk, however. The DOD's liquid, fossil-fuel-based energy supply lines extend from oil fields to refineries, and from U.S. Merchant Marine transports and ports of entry over sometimes

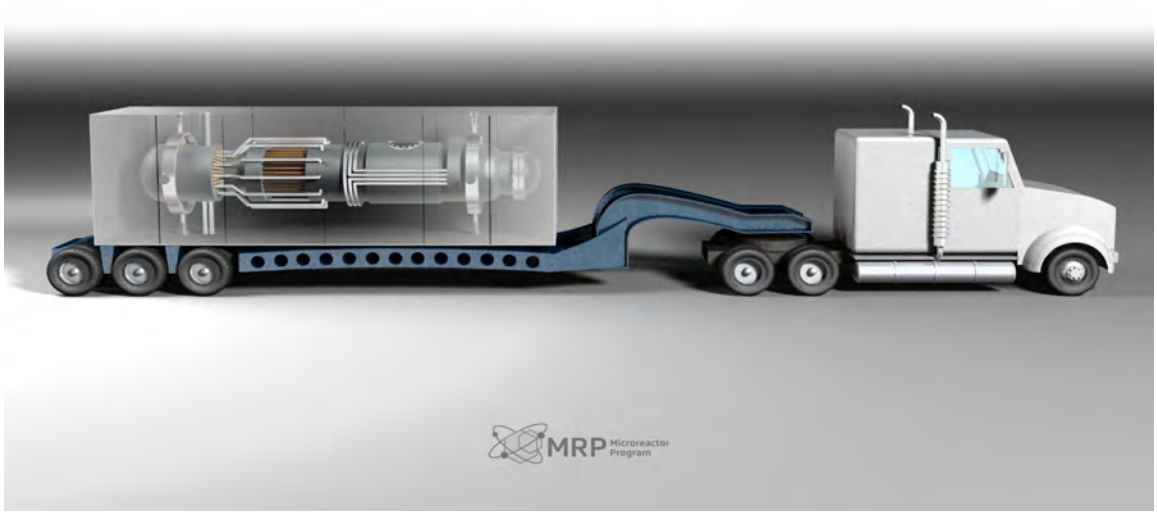
enormous distances before reaching the end user. Supply chain reliability is thus not a guaranteed proposition today, and was a driving reason for the Navy's adoption of nuclear power in the 1950s.[31]

The modern computerized and sensor-swept battlefield has amplified the need for electrical power, and energy has become a substantial vulnerability or limitation on our freedom of action.[32] The U.S. operates a variety of forward operating bases (FOBs), remote operating bases (ROBs), and expeditionary forces. In Iraq and Afghanistan, the DOD learned quickly that operations to deliver the supplies needed for combat operations could quickly become combat missions themselves, requiring the diversion of ground and air combat resources to protect fuel convoys.[33] Because mechanized armies can to essentially nothing without energy, fuel convoys became prime targets for our adversaries.

SMRs and the use of microgrids that are not reliant upon liquid fuels can thus become a key enabler for operations at these bases without the requirement to divert combat resources and risk the lives of the service members who would otherwise be needed to protect such convoys. The military has already used microgrids in austere locations that lack centralized power sources, typically diesel generators, in the past.[34] The difference now would be removing the need for fuel convoys by utilizing vSMRs at these forward locations. Such nuclear systems would be transportable, deployable, compact, safe, secure and reliable.

The use of vSMRs for local power could assure communications for troops, water treatment on site, spare-parts production through additive manufacturing, systems maintenance, and power necessities including heating, cooling and plumbing for service members.[35] These SMR systems would meet the needs of various operating environments so that energy itself remains an advantage, not a limitation. In an era in which warfare seems increasingly to involve the ubiquitous use of aerial drones for both sensing and attack missions – and in which the U.S. military has been working to expand its use of quiet electric vehicles in tactical operations – having forward-

deployed vSMPR-based battery-recharging capabilities would also be a significant benefit.



vSMR/microreactor illustration courtesy of Idaho National Laboratory

Soft Power Potential

Nuclear energy production and transportability would also provide the United States another key advantage during a time of rising global competition with the People's Republic of China. With SMRs promising to be cheaper, more rapidly available, and more grid-appropriate than huge traditional reactor designs, many developing countries have expressed interest in this new technology. Energy has long been associated with human prosperity, with some 1.18 billion people reportedly facing "energy poverty" in the developing world and with some 773 million people lacking electricity connection *at all* in 2020. SMRs and vSMRs, however, could provide transportable nuclear-energy to support responses to natural disasters, to stabilize local grids in other nations, and to sustain partner nations experiencing energy blockades or embargos.[36] As Hurricane Maria in 2017 highlighted, the DOD currently has a gap in its ability to provide transportable power generation to areas that experienced substantial natural disasters. As disaster intensity increases worldwide due to population growth, coastal development, and climate change, the need for such capabilities will only grow.[37]

In the 1960s, the United States converted the WWII Liberty Ship *USS Sturgis* into a floating nuclear power plant. (This vessel provided power for operations in Panama regularly, for example.) The idea of using deployable nuclear power source for humanitarian support and other emergency civilian uses is thus not a new concept for DOD, but rather one that with renewed focus and development could prove invaluable. The capability to ensure reliable energy at disaster sites, both foreign and domestic, would be a great asset to U.S. "soft power" in the world. The ability of such reactor systems to help circumvent energy embargos might be of considerable use in supporting U.S. allies and other partner nations as well, helping them resist coercion from our adversaries in time of crisis or conflict.

STURGIS: US Army Corps of Engineers

Modern Warfare

Modern advances in warfighting have resulted in a higher demand for reliable energy. The Pentagon is already examining more uses for electricity in battle to include vehicles, tanks, ships and planes,[38] and our military will continue to expand its reliance upon electricity-consuming communications technologies, sophisticated intelligence, surveillance, and reconnaissance (ISR) systems, and on-base necessities such as HVAC systems. Emerging warfighting

technologies will increase electrical demand further, such as with AI, directed energy weapons, electromagnetic pulse weapons, railguns, autonomous systems, and even additive manufacturing.[39]

By raising the energy requirements of deployed military forces, such new technologies will further increase the complexity and challenge of providing reliable fuel shipments, but assured fuel convoys or airlift shipments probably cannot be taken for granted in a high-intensity modern combat environment. (The logistics alone are challenging, but given the capabilities of our primary adversaries in this era of renewed great power competition, enhanced adversary anti-access/area-denial [A2/AD] capacities could make such deliveries impossible.) SMRs and vSMRs could provide a critical microgrid capability that removed many of the negative tradeoffs of security convoy travel. In this new era of global competition, there is a competition to develop and deploy technologies that will transform our security,[40] and this is one of them. To utilize these technologies of modern warfare, we must also *power them* in locations around the world – and SMRs/vSMRs offer a good way to do so.

Conclusion

The United States military thus faces an era of opportunity. The DOD now has the chance to take a path that reduces fossil fuel emissions while also gaining and exploiting a strategic advantage in utilizing SMR and vSMR technology for concrete operational and broader "soft power" purposes. SMRs therefore represent an "all of the above" solution for the Pentagon's energy needs.

Moving energy production and transmission for military installations under the purview of the DOD – and thus getting them off the civilian grid – would improve the reliability of electricity for defense functions and meet the military's expanding power needs, while reducing the benefits an adversary may expect by attacking civilian grids. (There would also be more civilian power available for the growing needs of America's private sector.) Such a move would also make DOD a more important stakeholder in the energy sector, giving it somewhat more leverage influencing industry technical

standards in order to ensure national security needs are met in this emerging market with less danger of ceding technological design and manufacturing dominance to our adversaries as we have done with batteries.

Developing an SMR-based energy security for the DOD will ensure American military operations are credible and reliable at home and abroad. This resource would broaden America's ability to operate in remote and austere environments without risk of combat over fuel convoys or a reduction in capabilities. The DOD should thus lead on militarily-applicable SMR development and work with other government agencies to explore adding SMRs to their own civilian nuclear portfolios, as well as using them as a transportable system for disasters or conflict.

The Pentagon should work with stakeholders in Congress, the Department of Energy, and the Nuclear Regulatory Commission (NRC) to streamline overly burdensome regulations and remove unnecessary bureaucratic hurdles to SMR development. (These federal stakeholders must also engage states individually to remove duplicative or restrictive permitting processes that exceed federal environmental and construction regulations. SMR development should *not* take ten years. Sending such positive signals to industry would also likely accelerate research and development.) The DOD must also impress upon policymakers and the public that nuclear energy is safe, clean, and reliable – and that DOD energy needs are increasing at a rate with which renewables are unable to keep pace. Securing funding for SMR projects to ensure survivability of emerging firms is integral to success. Lastly, the DOD must work with these federal stakeholders to secure relevant supply chains and material production while increasing the pool of sufficient labor talent.

Given the Second Trump Administration's emphasis on U.S. "energy dominance," commitment to investing in future warfighting systems, and commitment to a strong military, the Department of Defense has a unique window of opportunity in which to advance the energy infrastructure that serves military operations while enhancing deterrence at home.

* * *

About the Author

Paul Schecklman *is a doctoral student in the School of Defense and Strategic Studies at Missouri State University. The views expressed herein are entirely his own, and do not necessarily represent those of anyone else.*

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Lessons from Small-State Deterrence: Europe and the Nazis, 1937-44

by

Drew Nickels

Introduction

The challenges facing the smaller states around Nazi Germany in the lead-up to World War II and during the course of that conflict highlight the vulnerability of such states in proximity to a regional aggressor. Scholars of statecraft and deterrence often focus on the larger combatants in that 1939-45 conflict, because those countries played a more significant role in shaping the outcome of the war. However, understanding what options the *smaller* states had in the face of aggression can also offer insights into opportunities and challenges of deterrence, especially when aggressor states do not clearly act as a traditional rational actor.

World War II deterrence studies relegate the lesser states in that conflict to no more than brief narratives.[1] And, indeed, small countries seeking to maintain neutrality or independence from powerful neighboring states do have more limited options than large ones, and measuring *degrees* of temporary deterrent success can also be difficult where, in the end, it still ultimately failed. Before that war, however, some small states did attempt to do what they could for deterrent effect in order to sustain their independence or neutrality, such as by leveraging unique military factors, technical production capabilities, or sources of scarce raw materials. This essay investigates the extent to which such endowments could have contributed to the deterrence strategies of small states, particularly in connection with approaches to "deterrence by denial," and reviews whether any of those attempts influenced the intentions or actions of Nazi Germany.

Different Variables and Different Approaches

During World War II and the years preceding it, Czechoslovakia, Sweden, Switzerland, and Romania each sought to maintain neutrality and the autonomy of their foreign policy as they engaged with Great Powers such as Germany, France, the United Kingdom, and the Soviet Union. While Sweden and Switzerland successfully maintained official neutrality, however, Germany broke up and occupied Czechoslovakia, and significantly influenced internal Romanian politics to press Romania into the pro-German Axis alliance system. It is worth exploring the many factors that affected their greatly varying degrees of success.

Beyond simply a would-be victim's military power, many variables – such as territorial integrity, military size, national unity, raw material, technical capabilities, and long-term political design by the larger powers – may affect the success or failure of deterrence. Other, more idiosyncratic variables can also be present. Perhaps unique to the era, for instance, Adolf Hitler's convictions about the nature and future of the German race and German land, in conjunction with his deeply engrained antisemitism, directly shaped German military and foreign policy in ways beyond what one might expect from strategic factors such as natural resources, technology, or military posture.

The four countries analyzed here – Czechoslovakia, Sweden, Switzerland, and Romania – took greatly varying approaches during World War II. Of the four, Sweden came closest to successfully deterring invasion from Germany (and, later, even from the United Kingdom) due to balanced economic engagement and geographic circumstances that kept Sweden peripheral to the most significant fighting in Europe. However, Sweden probably was more successful in appeasing the combatants than in deterring them, and even this did not prevent Hitler from entertaining a long-term plan to occupy the country. Moreover, Sweden could still have done more. Specifically, it could have linked its plan to destroy its specialized ball-bearing

capacities with a public statement of deterrence objectives, but it did not do so. Relatedly, Hitler was likely not swayed by Switzerland's deterrence attempts in 1943 because the German Army had alternatives to Swiss transportation capabilities. However, the German Army does seem to have been deterred from invading Switzerland at specific points earlier in its war with France. While Romanian leadership made some statements about destroying its oil-producing capabilities, presumably uttered in an attempt to achieve deterrence by denial, it muddled its message with other conflicting signals. For its part, Czechoslovakia did not link technical capabilities to deterrence messaging and communicated to France that Czechoslovakia would sacrifice its territory for survival. The following pages will look at these various dynamics in more detail.

Germany's Drive for Economic Growth

German economic redevelopment and foreign trade policy affected the smaller neighboring states long before the war. Hitler's quest to rearm Germany and prepare for a prolonged global war generated friction among traditional finance and economic advisors who sought to avoid inflationary pressure,[2] as his drastic increases in military spending – beyond what one would have expected for a country of its size – injected money into the economy amidst a growing demand for limited natural resources and currency. As a result, the German balance of payments system became stressed to the point where Germany faced pressure to choose between increasing taxes, reducing defense spending, or increasing exports at the expense of defense expenditures. (This may actually have increased the risk of war, inasmuch as actually *using* the military in a conflict might have been seen as reducing the need to choose between those unpleasant domestic options.) All of this created economic shockwaves among the trade and finance sectors in Central and Eastern Europe, though of course Hitler cared little for the details or negative externalities such populations may have experienced.[3]

The German annexation of Austria significantly reduced this pressure on Germany's balance of payments, however, since Germany thereby acquired access to Austria's wealth. Taking over Bohemia and

Moravia from Czechoslovakia also allowed Germany to increase its ownership of Czech firms and benefit from existing and continuing Czech military exports to Romania and other neighboring countries. Furthermore, Germany imposed bartering practices on Eastern European countries (rather than currency payments) to help Germany manage its balance of payments challenge.[4] During this time, Hermann Göring, who among other roles was Hitler's head of the Luftwaffe (air force), took leadership of Nazi Germany's "Four Year Plan" in 1937 and effectively sidelined the finance minister, Hjalmar Schacht. (Schacht had been unwilling to promote Hitler's plans to bypass traditional concerns about the adverse effects of unresolved balance of payment problems.)[5] Thereafter, Göring managed such balance of payment challenges, sought to increase industrial capacity, and gain access to special technologies, while Hitler himself remained more focused upon first territorial annexation and then unification of Europe's various German-speaking peoples. This rough division of labor helped complicate the efforts of regional countries seeking to preserve themselves against Hitler's plans by leveraging resources and technology for purposes of deterrence.

Weak Alliances and the Czechoslovakian Break-Up

Czechoslovakia was one country that failed early to escape disaster. Historians often focus on the importance of the Munich Agreement, the problem of the Sudetenland Germans, and Hitler's final occupation of Bohemia and Moravia when discussing appeasement in the face of Nazi aggression and road to war.[6] There has been less emphasis, however, upon what alternative strategies the country might have had. Many observers have correctly noted that the Czechoslovakian military was more capable than the Austrian military, and that Czechoslovakia had better border defenses with more defensive capability than Austria, Hungary, or Poland.[7] Furthermore, Czechoslovakia had a significant military-industrial complex. In this context, its best strategy for maintaining independence rested with its alliance with France as a complement to its defensive systems in the Sudetenland.

Herman Göring was well aware of the value of Skoda, the famous Czechoslovakian arms plant in Western Bohemia in Pilsen, and saw this as a reason for invading the remainder of Czechoslovakia.[8] If the idea of acquiring Skoda for Germany had contributed to Hitler's desire to invade, then the threat of a Czechoslovakian self-destruction of that facility might have contributed to deterrence (by denial). Hitler's primary goal was simpler, however – the destruction of Czechoslovakia – and industry did not weigh into his thoughts; German unification with the Sudetenland was a byproduct of that destruction, though Hitler was indeed pleased with the idea of acquiring the facilities that manufactured Czech tanks.[9]

Czechoslovakia had made alliances with France and the Soviet Union, but since neither of those countries actually bordered Czechoslovakia, the ability of either of them to intervene or apply pressure on Germany was limited. Moreover, as the willingness of the French and British to enforce other terms of the Versailles Treaty had diminished over time, it became less likely that France or the United Kingdom would risk war simply to sustain the diverse ethnic political structure of Czechoslovakia – a country that the Allies had essentially created with the Treaty of Versailles in order to keep millions of Germans separate from Germany. Ultimately, Czechoslovakian Prime Minister Edvard Beneš resigned himself to partition, weakened his country's diplomatic position still further by signaling to France and the United Kingdom that he would be willing to surrender the Sudetenland to Germany.[10] This notice, and French leadership's unwillingness to confront Germany, undermined Czechoslovakia's best chance to defend the Sudetenland.

After the Munich Agreement and after the collapse of the remainder of Czechoslovakia in March 1939, Germany immediately sent a general to take over the Skoda factory.[11] Göring then incorporated the Skoda factory into his Four-Year-Plan Reichswerke corporation. Though the Skoda factory provided an immediate influx of nearly 300 quality tanks for the Wehrmacht (German army) and, in later years, produced a high-quality mobile tank destroyer, Skoda did not offer any unique technological advantage that might have given

Czechoslovakia leverage in a strategy to fend off Germany – either by producing enough high-quality arms to permit military defense of the country or at least by providing Germany enough value in arms imports from Czechoslovakia that seizing the country (and risking Skoda's destruction) made outright invasion less attractive.

Though the Skoda factory did not leverage unique technology, however, it did create useful tanks due to many years of experience developing various caliber weapons. By the late 1930s, Skoda produced a superior light tank, the LT vz. 35, or the "Lehký tank vzor 35." As a light tank, the LT vz. 35 was superior to the German Mark 1 and Mark 2 tanks because the LT vz. 35 had a 37-millimeter gun, whereas the Mark 1 had only machine guns, and the Mark 2 had a 20-millimeter gun.[12] Furthermore, the LT vz. 35 had superior and thicker armor compared to the Mark 1 and 2 and thicker armor at the front compared to the German Mark III medium tank.[13] (After the invasion, Germany allowed the remaining tanks sold to Romania and Bulgaria to improve the German Balance of Payment dilemma.[14]) Ultimately, while Skoda output materially contributed to the German army, the technology, and quantity were not unique in comparison to factories in Austria or Southern Germany; instead, Czechoslovakia's technical comparative advantage, before the war, resided mainly within its Skoda munitions factory skilled workforce and willingness to innovate when operating in a free society – a value that decreased under Nazi occupation.[15]

It is doubtful, however, that a Czechoslovakian industry-based leverage strategy employed in the interests of deterrence would have worked in any event. German leadership dynamics left no room for such influences to impede Nazi moves upon Czechoslovakia. Adolf Hitler never seems to have contemplated that Germany should occupy Bohemia and Moravia in order to acquire Czech industrial capacity or gold supplies. His motives were much simpler than that.

Hitler had the long-standing view that Czechoslovakia should never have existed as a state in the first place, and long-standing prejudices against the Czech ethnic identity.[16] Under his leadership, German foreign policy leaders noted repeatedly that the outright

destruction of the Czechoslovakian state was the ultimate goal.[17] Hitler was not dissuaded by industrial capacity or Czech defenses in the Sudetenland, and actually favored military combat against the entire Czech state in 1938. Ultimately, Hitler would have been perfectly happy to see the military destruction of Czechoslovakia, including the Skoda factory, and might even have *preferred* this – finding it more satisfying than a non-violent, pseudo-peaceful takeover.

Resource-Rich Sweden Partially Deterred Germany

Sweden successfully stayed neutral throughout World War II, but it also significantly bent traditional concepts of neutrality based on how isolated it was – or how much threat it felt – from either belligerent.[18] At first, this meant bending in Germany's direction.

Germany needed Swedish high-quality iron ore, which was superior to German ore,[19] and Nazi German politicians had long-term plans to subjugate Sweden or further degrade its neutrality in order to exterminate Sweden's Jewish population.[20] The Nazis were well aware of their partial dependency upon Sweden; before the war, during the German buildup, Göring noted that a strike in Sweden or the coming to power of an unfriendly democratic government would ruin Germany's heavy arms production.[21] Berlin's interest in controlling Sweden was thus significant.

During the war, however, geographic circumstances helped Sweden to maintain its neutrality, especially after Germany invaded Norway, thereby lessening the risk of *allied* invasions into Scandinavia and Finland or conflict with the Soviet Union. Since Sweden in this sense existed on the periphery of the fighting, it was able to exploit opportunities for trading with the Allied powers (some of this by means of smuggling) and with Germany alike.

Sweden's industrial base gave it some advantages in this respect. Though it traded high-quality iron ore with Germany in exchange for coke and coal, Sweden also exported the highest-quality ball-bearings, which could not be replicated anywhere else globally, specifically from

the SKF Global corporation. Significantly, SKF invested in relatively lower-quality ball-bearing factories in many countries, including the United States, the United Kingdom, France, Russia (briefly), and Germany. These factories provided ball-bearing parts to their host countries' militaries. Still, the ball bearings only available directly from Sweden were of higher quality and had lower failure rates. (In general, ball bearings reduce friction on two moving parts of a machine. They can be of various sizes, which helps improve efficiency in other industries, as well as airplanes, tanks, and locomotives.[22] For example, a part with relatively lower-quality ball-bearings may increase the risk of machine failure, which could result in an airplane crash.)

While these unique Swedish ball bearings supported the militaries of both sides, they were not critical for anyone since importing countries could still produce lesser quality (but still useable) ball bearings domestically, or import adequate substitutes if supplies from Sweden were cut off – though it might take many months to adapt.[23] As noted earlier, Sweden traded with the United Kingdom through clandestine means, which included sending ball bearings in diplomatic pouches, fast aircraft, or blockade-running fast ships.[24] SKF's business dealings with Germany were on advantageous terms, and there is little sign of German efforts at economic coercion against Sweden.[25] Nonetheless, Sweden bent, or effectively broke, the traditional rules of neutrality by allowing German soldiers to transit its country from Norway to Finland and, in reverse, down to Denmark.[26]

From 1943 onward, as Germany started to lose the war, allied nations pressured Sweden to reduce its ball-bearing exports to Germany, and Sweden partially complied. It did not proclaim any plan to destroy its ball-bearing capacity and equipment in the event of invasion, but SKF in Goteborg did complete a plan in April 1943 to do so if needed.[27] However, little information exists on how prepared or willing the Swedish government and the SKF corporation were to implement such plans. At any rate, Sweden did not announce any such plans, thus giving little sign that they contemplated any kind of deterrence message.

Hitler's commentaries about Sweden make clear that he thought about its iron ore supply to Germany, but he did not consider Sweden the only source of such ore, for in his view occupied portions of Russia could serve as a backup option.[28] Hitler did not envision Sweden being part of the land he deemed critical to expanding the German population, and he likely considered the non-Jewish Swedish population easier to Germanize in the long run after the war.[29] (Hitler did state, however, that Jews would "have to clear out of Sweden and Switzerland."[30]) Hitler apparently did not say much about controlling Sweden to the German General Staff, or at least not enough to have necessitated drawing up any invasion plans. Ultimately, the pressing concerns of the Eastern and Western Fronts crowded out any concerns Germany may have had with Sweden, which allowed Sweden to retain some autonomy in its foreign and trade policy with Germany.

Switzerland Stalled an Inevitable Invasion

During World War II, Switzerland maintained its neutrality, though that country may also have bent, or broken, neutrality rules, such as by allegedly allowing German transit of prisoners through Swiss territory, similar to Sweden allowing transit of soldiers.[31] (Note, however, that a Swiss-led commission refuted such claims in 2001, though it did conclude that Switzerland had helped Germany by closing its borders to a number of refugees fleeing Nazi oppression and by accepting Nazi transfers of looted gold.[32]) In the long run, Nazi Germany – had it been more successful in the war – would have likely eventually enveloped Switzerland through political or military force, because Hitler disliked the country and had strongly antisemitic perceptions of Switzerland, and also because of his desire to ensure no German-speaking people existed *outside* of Germany and within a democratic government.[33]

The historical image of Switzerland's survival during the war has developed over time, from an initial reputation as an invasion-resistant showcase of mountain defenses to a later image of financial collaboration with the Nazis, due to records released in the 1990s about unaddressed lost Swiss bank accounts of Holocaust victims.[34] Though

some authors at the time felt that Switzerland deterred Germany from invading it because of the high numbers of armed citizen soldiers in that country,[35] this seems unlikely because Yugoslavia represented a similar partisan risk but this did not deter Germany from invasion.[36]

One feature that may have helped Switzerland sustain its neutral status, however, was indeed related to its geography and defenses, in conjunction with its public willingness to destroy key transportation links upon invasion. Such plans also included creating a "national redoubt," which Switzerland announced publicly in what it called "the Rütli Report," so named because General Guisan, head of the Swiss Armed Forces, collected his officers at the Rütli Meadow on July 25, 1940 to relay this message. Switzerland later also broadcast portions of this message over the air for German consumption, which may have helped with stalling a German invasion by making the country seem indigestible.[37]

Hitler often railed against Switzerland to the German General Staff, resulting in their development of Operation Tannenbaum, which would have involved invading and partitioning Switzerland into German and Italian enclaves. Hitler noted that any Jews surviving in Switzerland would infiltrate Germany,[38] suggesting that he also would have liked to extent the Holocaust there. Ultimately, however, Hitler never gave the final order, and Germany never invaded Switzerland.

Romanian Infighting Prevented a Deterrent Strategy

Like Czechoslovakia, the post-World War I Romanian state grew by incorporating land previously belonging to other countries.[39] In the Romanian example, the land previously belonged to Hungary, Bulgaria, and the Russian and Ukrainian territories of the Soviet Union. Romania also contained several diverse non-Romanian ethnicities, including Germans, Hungarians, Bulgarians, Ukrainians, and Russians, which contributed to territorial insecurity as neighboring countries sought to regain control over their former populations.[40]

Deeply concerned about losing territory to Hungary, Romania attempted to align its territorial policies and diplomacy with Czechoslovakia and Yugoslavia, with the support of France through what was known as the "Little Entente." However, this grouping did not withstand pressure from Germany or Russia for long.[41] While Romania attempted to leverage its oil capacity and processing to gain favorable treatment from Germany, it failed to enact any explicit deterrence strategies – primarily due to internal political dynamics and infighting within the country's right-wing paramilitary groups.[42] Economically, once German investment and occupation gave the Nazis majority control of Czech firms in Bohemia and Moravia through Göring's Four-Year Plan organization, Romanian heavy industry could not avoid growing integration with Germany due to cascading investment spillover effects.[43]

Interestingly, regarding deterrence threats, upon learning of the Molotov-Ribbentrop Pact, Romanian leader King Carol threatened through an intermediary to destroy the Romanian oil fields if the Axis invaded. However, King Carol also sent other, conflicting messages that confused the deterrent signal.[44] (During the war, the allies also expressed concern about German domination of Romanian oil fields by noting, in 1939, that the United Kingdom and France reserved the right to destroy the oil wells.[45]) Romania did attempt to prevent German domination of Romania's heavy industry and those oil fields. Still, these efforts failed after the general Ion Antonescu overthrew King Carol in September 1940. From Hitler's point of view, when the pro-British King Carol was in power, Romania would have had to be turned into an entirely agricultural society with no industry.[46] Later, however, Hitler admired Antonescu's leadership, especially in hoping that Antonescu would "get rid of the Jew" in Romania.[47] (Antonescu did persecute Jews, and was executed for war crimes and treason after the war.)

Romania had lost 30 percent of its territory to the Soviet Union and Hungary through various agreements around the time of the Molotov-Ribbentrop Pact of 1939, which led to the rise of right-wing antisemitic paramilitary groups in Romania.[48] The Romanian political response to this loss of territory was to lean further into the German-

led Axis political sphere; under Antonescu, it officially joined the Axis alliance in November 1940. Even then, however, after the Axis defeat, Romania failed to regain all its claimed territory.[49]

Deterrence by Punishment vs. Deterrence by Denial

Post-war deterrence theory has routinely focused on the importance of ensuring a capacity for retaliation against aggression, as highlighted in various studies emphasizing "deterrence by punishment" approaches.[50] This emphasis may stem largely from the United States' own stress upon policies of ensuring nuclear retaliation vis-à-vis the Soviet Union after 1945. Few other states have had that option, however, and certainly not the smaller neutral European states that are the subject of this study, and at a time before the Atomic Bomb had been invented. For them, deterrence by punishment was less relevant. These smaller states had little conventional capability to punish invaders, such as with strategic aerial bombing. Nevertheless, these smaller states still had, to some degree, opportunities to establish and signal "deterrence by denial."

Comparing punishment and denial theories, deterrence by punishment increases the costs for the aggressor, while deterrence by denial works by reducing the probability of success for that aggressor.[51] Ultimately, prior to and during World War II, those small states had little ability to inflict critical costs on any powerful invader, so they could not deter through punishment; instead, their best hope probably lay in relying on *denial* signals, to show that a German invasion would fail, or would at least result in too few benefits to make it worthwhile. Even then, however, the countries mentioned above were generally unable to enact an effective overall strategy against Hitler. When facing a potential aggressor of his sort, such denial approaches may have had little chance of success, for their impact on German planning would almost certainly have been overwhelmed by Hitler's violent prejudices and antisemitism, swamping any more normal military, economic, or rational calculus.

Switzerland's Case: Limited Success in Deterrence-by-Denial

In some sense, Switzerland did successfully deter the German military elite – though not Hitler himself – by using deterrence by denial, dissuading it from supporting an invasion during a brief period after the fall of France and during the subsequent focus on the Battle of Britain and planning the invasion of Britain (Operation Sea Lion). However, the lack of a German attack resulted more from the dynamics between Hitler and the German Army General Staff than from any strategic effort or signaling by the Swiss military or leadership.

The Swiss, in fact, missed key efforts to bolster their deterrence by denial strategy, though it did include public warnings of destroying key transport nodes, destroying specialized military-related machine tools and precision technology firms, and highlighting the national redoubt in the mountains. Swiss partial demobilization of the military after the fall of France, for example, reduced the effectiveness of any deterrence posture.[52]

Despite such mixed signals, at least some Germans seem to have wondered whether attacking Switzerland would be more trouble than it was worth. On August 26, 1940, General Franz Halder, Chief of Staff of the German Army High Command, advised Hitler that "Switzerland is determined to resist an invasion with all its might," which Halder noted was "intended to deter Hitler."[53] (Halder did not identify the nature of this resistance, however, such as whether it was related to the quality of Swiss soldiers, their equipment, or their plans for a fortified "national redoubt" in the mountains.[54]) Furthermore, Halder and the rest of the German General Staff may have preferred alternate opportunities when evaluating the costs associated with invading Switzerland. Competing priorities at this time included preparing for the invasion of the United Kingdom, addressing a potential failure of the Armistice with the Vichy French regime, planning to seize Gibraltar from Britain, and the fear of a revivalist France in North Africa.[55] With such other concerns to worry about, evidence suggests that the German General Staff was relatively

resistant to Hitler's interest in attacking Switzerland during this early period.

Before Halder's deterrence-by-denial warning, the German military plans for Switzerland were unclear, as was Hitler's vision for that country. However, Hitler did assume Switzerland would indeed fall to German political pressure if surrounded. Apparently with this in mind, he ordered the German military to observe Swiss neutrality at the start of the war in 1939.[56] However, at several junctures, Hitler also pressured his generals and Italy to surround Switzerland more rapidly – specifically, before the armistice with France. Italy failed to meet these commitments, however, leaving an unoccupied gap for France, which kept a trade route open for Switzerland. Enraged by this, Hitler was also angered by the fact that Swiss pilots shot down several German fighters and bombers in early June 1940.[57]

Therefore, after Germany completed its armistice with France on June 24, 1940, the German General Staff ordered Otto Wilhelm von Menges, under pressure from Hitler, to create the first of three drafts of an attack on Switzerland.[58] This first plan involved surprise attacks from multiple directions to prevent the Swiss from retreating to the mountains, and attempts to protect Swiss arms centers in Solothurn and Oerlikon (the name both of a region and a technology firm) from destruction – presumably so that they would thereafter be available for German exploitation. While these documents recognized that Swiss forces might resist, they assessed that Switzerland would ultimately cave upon invasion.

However, staff updates to the plans repeatedly collided with other German campaign priorities, particularly in Romania and the Balkans, and then plans for the invasion of the Soviet Union (Operation Barbarossa). By April 1941, the risk of an imminent invasion of Switzerland had receded, after which Germany relied instead on economic pressure, which the Swiss mitigated by shifting trade more toward Germany. Even as late as March 1943, Swiss military leader General Henri Guisan tried to keep deterrence by denial alive, privately informed the Nazi intelligence officer Walter Schellenberg that the Swiss army would destroy key Alpine railroads

if invaded. However, whether or not that message reached senior German leadership is unclear.[59]

Sweden's Missed Opportunities for Deterrence-by-Denial

Sweden's geographic location, dependence on German coal, and value to Germany as an iron ore supplier made its neutrality precarious. The country leaned toward Germany when the Nazis seemed to be winning the war. Sweden might have thought the risk of damage to the infrastructure permitting extraction of its valuable iron ore supply would contribute to deterrence by denial, but the country made no explicit public communication to this effect,[60] and internal Swedish political dynamics allowed no consensus and undermined clear signaling. For instance, publicly announcing plans to destroy the critical hydroelectric dam in Northern Sweden to disable power needed to extract iron ore, or publicly announcing plans to destroy key advanced ball-bearing manufacturing could have supported deterrence by denial. And indeed, Gunnar Hägglöf, a Swedish diplomat during the war, noted that he "several times" told German delegates that blowing up the indispensable power stations would be "the action of a moment."[61] However, it is unclear if German senior leadership or the military received this message, or – if they did – whether it affected their planning.

Rather than sustain a consistent posture of deterrence, Sweden mixed vague and inconsistent signals of deterrence by denial with appeasement, frequently acquiescing to German demands, such as by allowing German army troop movements across its territory and by continuing to build warships for Germany. This effectively meant that Sweden was a near-client state for Germany, at least while Germany was winning. In exchange, however, Sweden maintained some independence, protected its population from direct occupation, and maintained essential coal imports.

Hitler's Dismissal of Swiss and Swedish Capabilities

Assessing the success of the deterrence messaging received by Germany requires insight into the actions and deliberations of the

German Army General Staff and Adolf Hitler and his bureaucratic apparatus. Rather than Germany functioning as an efficient unitary state, various political and military factions sought to influence Hitler, who himself could alter military strategy on a whim. This made policymaking volatile and unpredictable, reducing the role of the kind of careful calculation that one might have expected from the General Staff. As it turned out, neither Switzerland nor Sweden deterred Adolf Hitler; instead, he was likely only distracted from focusing upon these states by the challenges of dealing with the United Kingdom, France, and the Soviet Union.

Regarding Swiss military capabilities, Hitler did not consider Swiss military officers to have any technical credibility, partially due to his antisemitic theories that Jewish commercial interests had sapped Swiss military vigor and his view that neutral states were militarily and culturally inferior in any event.[62] Irrespective of any invasion, he likely assessed that Switzerland would eventually fall under German political control due to cultural pressure. Indeed, Hitler stated that "a state like Switzerland, which is nothing but a pimple on the face of Europe, cannot be allowed to continue."[63]

On Sweden, Hitler had even fewer thoughts, probably because that country lacked large German-speaking enclaves. He did not fully value or understand the key importance of Swedish iron ore to German industry, contending that Germany could find alternate supplies in Russia after he won *that* war.[64] In the long run, Hitler stated that future German generations should destroy Sweden, referring to the Swedes as "vermin."[65] This statement underscores Hitler's overall viewpoint: foreign technical and resource capabilities were, at best, secondary to his more ideological convictions on land and race. This tended to undermine the effectiveness of regional counterstrategies of deterrence by denial.

Concluding Analysis and Contemporary Insights

On the whole, of course, the relatively smaller countries of Europe did poorly in the face of aggression by a much stronger Germany. Yet their records of (relative) success nonetheless vary.

Relatively smaller countries that existed on the path of Nazi Germany's territorial expansion for living space, such as Czechoslovakia and Romania, fared worse than those outside the scope of that planned living space, like Switzerland, or on the periphery of heavy German fighting, like Sweden.

Possession of critical technology or resources alone was insufficient to protect a state's neutrality, such as in the Czechoslovakia and Romania examples. Still, trying to leverage such advantages might offer the chance of at least some success in conjunction with other deterrent communications practices, as Switzerland attempted, at least partially. The smaller regional states did not stand much chance of success through deterrence by punishment. (Though the Czech and Romanian armies were larger than one million soldiers, for instance, these large armies did not protect their independence.) Countries with long-established national borders, such as those of Sweden and Switzerland, did better than those with recently-adjusted borders that cut through contested national or ethnic groups, such as in the Czech or Romanian cases. Internal national unity also helped ensure stronger resistance to external cultural, political, financial, and military pressure, with Switzerland and Sweden as prime examples.

No state in this study had a unique material or technology that it could leverage against Germany, but each had some comparative advantage in quantity or quality. These states derived the highest value from industrial production, including the people, processes, and inputs that made it possible. To some extent these capabilities may have had some modest deterrence-by-denial effect. Workers in successful private sector industries working under occupation, for instance, would see their incentives and capacity drop, as illustrated by the relatively poor performance of Skoda under occupation. Yet small, specialized factories such as SKF in Sweden were more logically "self-destructible" than larger Skoda-type facilities or oil fields. Adding a clear public messaging component to national strategy while developing self-destruction options for such installations could perhaps have improved deterrence, at least to a point. Even then, however, it is unclear that such approaches could have succeeded

against an adversary like Adolf Hitler – though perhaps modern states can learn from these examples if they are lucky enough to face someone less fanatical.

In the modern era, therefore, states can draw valuable lessons from these relatively little-known examples from World War II. I offer four. First, advanced or rare technical capacities are unlikely to be decisive in ensuring deterrence by denial if the adversary prioritizes ideological or territorial gains with the monomania of a Hitler. Second, deterrence should involve public and credible commitments to denial, such as clear plans to destroy critical infrastructure that would be valued by an occupier, rather than simply relying upon adversary inference. Third, as shown by Romania's example, a fractured internal society weakens deterrence. Fourth, allies with weak resolve and reliant on allies too remote to offer effective militarily support, such as with Czechoslovakia's reliance on France, are unlikely to deter enemies. Ultimately, a further lesson might be to temper expectations. As these cases show, a small state's ability to leverage unique capabilities and its determination to deny its resources to an invader is of some but only limited use, and various issues of economics, geography, global power balances, and ideology might still overwhelm any intended deterrence-by-denial effect.

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About the Author

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Notes

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[48] Eugen Tomiuc, "Romania's Last King Recalls Role in World War II," *Radio Free Europe/Radio Liberty*, December 14, 2017, https://www.rferl.org/a/Romanias_King_Michael_Recalls_Start_Of_World_War_II/1811357.html.

[49] *See, e.g.*, Allied Treaty of Peace with Romania (signed February 10, 1947) (entered into force September 15, 1947), https://avalon.law.yale.edu/20th_century/usmu011.asp.

[50] Michael Mazarr, "Understanding Deterrence | Rand," Understanding Deterrence, April 19, 2018, 2, https://www.rand.org/pubs/perspectives/PE295.html.

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[56] William L. Shirer & Ron Rosenbaum, *The Rise and Fall of the Third Reich: A History of Nazi Germany* (Simon & Schuster, 2011), 590.

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[58] Urner, "'*Let's Swallow Switzerland*,'" 148.

[59] Halbrook, *Target Switzerland*, 180.

[60] Chevallaz et al., *The Challenge of Neutrality*, 10.

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SCHOOL of DEFENSE AND STRATEGIC STUDIES

No. 3 (Spring 2025)