MOTIVATIONS BEHIND CHINA’S HYPersonic WEAPONS DEVELOPMENT

By

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Research question:
Why did China decide to begin developing hypersonic weapons in the last decade?

Abstract:
In recent years, Russia and China have increased their interest in developing hypersonic weapons, spurring a potential arms race with the United States. These technologies provide users with significant strategic advantages due to their fast speeds, maneuverability, and low trajectories. This paper seeks to examine the motivations behind China’s attempts to build its stock of hypersonic weapons to determine if it is responding to the United States’ own hypersonic weapons capabilities. By examining the weapons development timeline of China’s technologies and cultural influences on its military strategies, it was concluded that Beijing did not begin these developments in response to the United States’ own hypersonic weapons systems developments. Rather, China seems to be pursuing these technologies to counter regional threats in the South China Sea and use these weapons as a means to establish itself as a strong military threat.
Table of Contents:

Research question.................................................................................................................. ii

Abstract.................................................................................................................................... ii

1. Introduction........................................................................................................................... 1
   1.1 Types of Hypersonic Weapons...................................................................................... 1

2. Methods .................................................................................................................................. 2
   2.1 Acknowledgment of Limitations................................................................................... 2
   2.2 Sources.............................................................................................................................. 2

3. Literature review.................................................................................................................... 3
   3.1 How Nations Choose Nuclear Weapons Systems....................................................... 3
   3.2 Benefits of Hypersonic Weapons .................................................................................. 7
   3.3 How States Choose Conventional Weapons................................................................. 8

4. Data......................................................................................................................................... 10
   4.1 China’s Hypersonic Weapons Development............................................................... 10
   4.2 Cultural Influences on China’s Strategic Decisions....................................................... 19
   4.3 United States Hypersonic Weapons Development...................................................... 21

5. Discussion............................................................................................................................... 23
   5.1 China’s Motivations for Hypersonic Weapons Development...................................... 23

6. Conclusion............................................................................................................................... 26

7. Bibliography............................................................................................................................ 28

8. Curriculum Vita...................................................................................................................... 33
**Introduction:**

With the rise of great power competition as outlined in the 2018 National Defense Strategy, the United States has put a renewed focus on developing skills associated with conventional warfare. In particular, the United States has highlighted Russia and China as its near-peer adversaries and is adjusting its modernization priorities to counter technological advances of these two countries, which includes the research and development of hypersonic weapons. Researchers have stated that these developments are turning into a potential hypersonic arms race between the three states. Additionally, hypersonic weapons are unique in that they cut down reaction times, providing additional incentives for countries to speed up the weapons development process.

This paper will examine the motivations behind China’s push to develop these technologies in recent years by examining the development of its hypersonic weapons and potential cultural influences behind its weapons decisions. These motivations are important to determine because they can provide further insight into where and how these countries will deploy hypersonic weapons.

**Types of Hypersonic Weapons:**

There are two main types of hypersonic weapons - glide vehicles and cruise missiles. Hypersonic glide vehicles are unpowered and gain their initial speed from being launched by a rocket before continuing to their targets, whereas hypersonic cruise missiles rely on engines that provide power throughout flight. Glide vehicles typically fly at altitudes of 25 to 60 miles above sea level, whereas hypersonic cruise missiles generally fly at altitudes at 12 to 19 miles.¹

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Hypersonic weapons are defined as systems that can travel at Mach 5 or faster while also maintaining the maneuverability of a traditional ballistic missile. These systems are capable of carrying conventional and nuclear payloads, and can be deployed in a variety of ranges.

**Methods:**

This paper will follow a historical research method that individually traces the hypersonic weapons development efforts of in order to determine the motivation behind the state’s technology improvements. Additionally, it will also examine cultural influences that may impact China’s weapons decisions. The paper will individually examine each state using a narrative format. Each section will be organized chronologically to determine if hypersonic weapons decisions were prompted by specific historical events or policies.

**Acknowledgement of limitations:**

It is important to acknowledge that this paper is limited only to open sources that detail Chinese weapons development efforts. Information about their systems is publicly available through media and scientific reports; however, there is likely additional information that is classified.

**Hypothesis:**

China has begun to invest in hypersonic weapons to counter those of the United States.

**Sources:**

This paper will rely heavily on state-reported information released through media and analyst reports, due to the inaccessibility of classified information on the subject. Hypersonic weapons are relatively new when compared to traditional weapons systems, so these sources will likely contain the most up-to-date available information on the topic. Additionally, there is a
large amount of literature on the topic that has been produced by the government and think tanks within the last few years due to increasing interest.

Although information gathered from these reports cannot be individually verified, these sources are sufficient for gaining a deep understanding of the subject because many government agencies —such as the Congressional Research Service — develop documents that are also based on data provided by these open sources.

**Literature review:**

This literature review is based around examining how states choose both nuclear and conventional weapons systems. This is important to acknowledge, as hypersonic weapons can be equipped with or without nuclear warheads.

*How Nations Choose Nuclear Weapons:*

The proliferation of hypersonic weapons is sparking fears of a potential arms race between Russia, China, and the United States. Because of this, it would be beneficial to examine literature that explores how states choose their weapons systems. There will be a particular focus on nuclear weapons because Russia and China are exploring ways to equip their hypersonic weapons with nuclear warheads.

Scott Sagan explores three models to explain the reasoning behind states’ decisions to adopt and produce nuclear weapons, which include the security, domestic, and norms models. Ultimately, he concludes that the security model is not enough to explain the motivations behind states’ nuclear weapons decisions, and that “different historical cases are best explained by different causal models.”

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2 Sagan, 85.
The security model suggests that states that, generally, countries have two options: developing a nuclear capability themselves or creating an alliance with a nuclear power. Sagan notes that under this model, “Every time one state develops nuclear weapons to balance against its main rival, it also creates a nuclear threat to another state in the region, which then has to initiate its own nuclear weapons program to maintain its national security.”

This is evidenced by the waterfall of nuclear capability development following World War II. After the United States dropped an atomic bomb in August 1945, others became motivated to pursue the technology as a counter-balance. For instance, the Soviet Union reinvigorated its own program soon after, and other countries such as France and China followed suit.

In “The Culture of Military Innovation: The Impact of Cultural Factors on the Revolution in Military Affairs,” Dima Adamsky discusses how states choose to improve their military on a broader scale. For instance, between the mid-1970s and early 1980s, the United States put a focus on developing precision-guided weapons in an attempt to “use high technology to build better weaponry systems than those of the Soviet Union.” This is in line with the security model described by Sagan.

David Krieger from the Nuclear Age Peace Foundation seems to concur with the security model, stating that China began to develop its own nuclear technologies out of fear “that without nuclear weapons, its security was threatened by both the US and Soviet Union and that it would

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3 Sagan, 57.
remain subject to their bully potential.”⁵ States were driven not by a desire to use these technologies for offensive operations, but rather to deter other countries from conducting first strikes, he noted. For example, China was vocal in its intent to use this technology only as a deterrent force against countries that already had the capability. Additionally, the United States was motivated to develop nuclear weapons because officials were under the impression that the Germans were developing their own. President Franklin Roosevelt and his advisors believed “US nuclear weapons would be necessary to assure the security of the United States and the Allied powers by deterring the Germans from using theirs with impunity.”⁶ Weapons that are able to cause large-scale destruction have been shown to be used as a deterrent.

The domestic politics model focuses on how nuclear weapons decisions are made in accordance with bureaucratic or political interests. Sagan notes that when the nuclear energy establishment, units within the military, and politicians are able to form coalitions, then the state is more likely to adopt nuclear weapons.⁷ This is reflected in the case of India’s response to China’s 1964 nuclear test, he said. In this case, officials “did not adopt a consistent policy to pursue security guarantees,” and flipped back and forth on policy decisions. Prime Minister Lal Bahadur Shastri opposed nuclear weapons development but compromised with Parliament on a decision to develop a project focused on creating a capability to detonate a peaceful nuclear explosion. This effort was later canceled, but scientists began lobbying for additional nuclear weapons development, which was approved by Prime Minister Indira Gandhi.

⁶ Ibid.
⁷ Sagan, 64.
Sagan notes that this decision reflects the importance of domestic political concerns rather than interest in national security.

The third model Sagan describes is the norms model. This model focuses on nuclear weapons as a symbol of a state’s identity. In these cases, decision on nuclear proliferation are influenced by “deeper norms and shared beliefs about what actions are legitimate and appropriate in international relations.” Sagan uses this model to explore France’s decision to build nuclear weapons—the security model suggests that it was in response to threats from the Soviet Union, but further examination suggests that French leaders recognized the symbolic significance of the weapons. Sagan notes that this decision linked up with the French’s 1951 Five-Year plan, which outlined the government’s goal to “still be an important country” within 10 years, and stated that leaders were looking to revamp the country’s military capabilities following World War II. Specifically, Charles de Gaulle seemed to be particularly interested in how nuclear weapons could help France’s international reputation, Sagan notes.

Conversely, Krieger outlines why countries may choose not to develop their own arsenals of weapons. In many cases, countries—specifically poorer nations—simply do not have the capability or means to invest in advanced technologies. Some national leaders also fear that developing such platforms would create a negative perception and lead to consequences such as losing economic support and alliances. A nation must be economically independent enough to develop new platforms without fearing a potential loss of support.

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8 Sagan, 73.
The strategic benefits of hypersonic weapons may also contribute to a change in
dynamics between Russia, China, and the United States. Putin has warned that the United States
may be tempted to make a first strike and that these weapon systems “could negate all previous
agreements on the limitation and reduction of strategic nuclear weapons, thereby disrupting the
strategic balance of power.”

Benefits of Hypersonic Weapons

This paper will examine how the security model may apply to China’s decisions to
pursue hypersonic weapons. Robert Haffa and Anand Dalta researched some of the benefits of
these platforms in 2017, concluding that hypersonic weapons can provide numerous strategic
advantages when used as an anti-access/area-denial capability. This means that adversaries
would be able to counter the United States’ forward deployed bases and ports. The authors note
that these strategies have become prevalent in China’s military strategies and conclude that Iran
may possibly be pursuing the same ideas.

These types of capabilities would prevent the United States from entering theaters of
operations, they note. Besides hypersonic weapons, adversaries can bolster their offensive
systems with precision-guided munitions such as rockets, artillery, and mortars. These platforms
could provide adversaries with particular advantages over Navy ships by blocking them from
reaching their forward positions. Hafa and Dalta explain: “Regardless of the scenario, whether in
the Western Pacific, Northeast Asia, or the Persian Gulf, the U.S. military would be forced to

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operate at longer ranges — and thus with less efficacy — to account for the capabilities of these
offensive and defense systems.”¹²

Additionally, because these systems have low trajectories and high speeds, they are more
difficult to track using traditional radars. Ballistic weapons — which operate at higher
trajectories — are easier to track with ground-based missile detection by using physics to
calculate their location and target.¹³

_How States Choose Conventional Weapons_

Because hypersonic weapons can also be deployed without nuclear warheads, it is
important to examine the reasoning behind conventional weapons decisions. Diam Adamsky
explores this topic in “The Culture of Military Innovation,” arguing that cultural traits of
countries affect its strategic decisions.¹⁴

To demonstrate this idea, Adamsky highlights cultural norms that affected the Soviet way
of war, noting that the Soviets tended to focus on increasing its manpower rather than adopting
and developing new technologies.¹⁵He notes that Russian culture highly relied on “shortcomings,
suffering, and the need to endure” as a normative reality.¹⁶This resulted in an attitude that
brought people to focus more on overcoming internal rather than external obstacles.
Additionally, Adamsky defines Russian culture as “polychronic,” meaning that people “live and
operate in several time frames at once and are preoccupied with pursuing different tasks

¹² Hypersonic weapons: appraising the third offset pg. 6
¹³ https://www.rand.org/pubs/research_reports/RR2137.html
¹⁴ Adamsky, Dima. _The Culture of Military Innovation: the Impact of Cultural Factors on the
Revolution in Military Affairs in Russia, the US, and Israel_. Stanford, CA: Stanford Security
Studies, 2010. 16.
¹⁵ Ibid. 56.
¹⁶ Ibid. 42.
simultaneously in an interconnected way.” This puts a smaller focus on servicemembers as individuals, and Russian culture further influenced military strategy by developing a higher tolerance for casualties. The Russians developed a focus on fighting with large troops to make up for a lack of technological prowess for overcoming physical obstacles on the battlefield.

Because of this cultural attitude, the Soviets did not make decisions based on whether or not a new conventional weapon system would be able to cut down on casualties and manpower. Rather, they “eschewed technology for technology’s sake” and pushed to ensure that all weapons were in line with military doctrine. New technologies were chosen solely to meet practical needs.

This attitude towards advanced weapons systems continued until the 1970s, when the Soviets made a concerted effort to improve its weapons technology following a new theory of victory that led to a “new military-technical revolution.” The Soviet Union’s authoritarian culture helped execute weapons acquisitions that included systems such as advanced sensors, precision-guided munitions, and command and control capabilities. As noted by the CIA, between 1973 to 1987 the Soviets acquired more weapons than the United States in every type except for ships. However, keeping in line with Soviet cultural influences that emphasized quantity over quality, these systems were still considered to be less technology advanced by the CIA. Using the Soviet Union as an example, Ademsky shows how culture can be a large influence on conventional weapons decisions.

Summary of Existing Scholarship:

17 Ibid. 46.
18 Ademsky, 45.
19 Ademsky, 55.
Literature suggests that there are multiple reasons why states choose to develop certain nuclear weapons systems, which span from political to national security explanations. The three models include the security model; the domestic politics model; and the norms model. Additionally, a state’s cultural values can impact its decisions to adopt certain conventional weapons systems over others.

**Data:**

*Chinese Hypersonic Weapons Development*

Over the past few years, China has not hesitated to make its hypersonic weapons development programs known. Through academic papers and various state-run media, Beijing has publicized its intention to become a leader in the field by providing details of its research and development programs. For instance, China has published the most research papers at a notable hypersonic weapons conference since 2005. As noted by the Congressional Research Service, China has a “robust” research and development program devoted to these systems and has held 20 times more hypersonic weapons tests than the United States.

The most notable of Beijing’s hypersonic weapons developments first began in 2014, when Chinese state media announced the first test flight of the WU-14. The weapon, also known as DF-ZF, is said to be able to travel at speeds up to Mach 10. According to *The Guardian*, this test marked China as the second country to pursue these technologies, following only the United

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States. WU-14 is known to have undergone three tests in 2014. The first test was held in January 2014, when the system was believed to have reached Mach 10. One test in August resulted in a “suspected failure,” as evidenced by debris near a crash site in Mongolia, according to American media. The third was held in December 2014, although the range of the test is unknown.

This same year, the United States made a concerted effort to challenge Chinese claims to the South China Sea by sending warships around the Spratly Islands. China has been building additional reefs in the area since 2014 to expand its influence. United States officials publicly stated that they did not consult Chinese counterparts on the maneuver, noting that it was within their freedom of navigation rights. At a joint press conference, former President Barack Obama reinforced this idea by stating: “The United States will continue to sail, fly and operate anywhere that international law allows.”  

territory since 2012. Additionally, in 2015 U.S. announced that it would have four littoral combat ships based in Singapore by 2018.

These actions prompted a strong negative reaction from Beijing, which saw this move as a way for the United States to flex its military muscles. Lu Kang, a foreign ministry spokesman, warned that Beijing may potentially increase its military presence in the South China Sea in response, and Chinese officials labeled the action as “extremely irresponsible.”

Kang’s sentiments were reflected in Beijing’s 2015 military strategy. Citing a concern that “offshore neighbors take provocative actions and reinforce their military presence on China’s reefs and islands that they have illegally occupied,” the document outlined a strategic shift from the “traditional mentality that land outweighs sea” to a strategy that is more focused on protecting maritime assets. This required an improvement in the Chinese People’s Liberation Army (PLA)’s long-range precision strike capabilities.

This period in time was significant in China’s history of missile development, as it was part of the “sweeping organizational reforms to overhaul the entire military structure,” according

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to the strategy.\textsuperscript{32} In conjunction with the strategy’s release, President Xi Jinping announced in 2015 his desire to change the People’s Liberation Army’s force structure and equipment.\textsuperscript{33} This overhaul not only called for more integrated military services, but also an improvement in the PLA’s naval and aviation assets. To fund these new initiatives, China increased its budget by 10 percent for a total of $145 billion.\textsuperscript{34} This gave China the second largest military budget in the world, second only to the United States.

China also increased its hypersonic research efforts during this time. In the same year, it began operating what was the world’s largest hypersonic wind tunnel.\textsuperscript{35} The tunnel, known as JF-12, could test systems traveling between Mach 5 to 9 and was also used to test material durability. Scientists were also able to use the tunnel to examine different scramjet configurations, opening the door for the possibility of developing additional hypersonic weapon systems. According to Chinese state media, the tunnel is 265 meters long and can replicate altitudes of 25 to 50 kilometers.\textsuperscript{36} Researchers were reported to have been working on different

\textsuperscript{35}Nurkin. 189
scramjet engines, which allow these technologies to combine oxygen and hydrogen fuel for hypersonic travel.\textsuperscript{37}

In 2015, China either unveiled or entered into service many missile development efforts that are still in its arsenal today. For instance, these include the YJ-12, a ramjet-propelled supersonic anti-ship missile; the DF-26, an intermediate-range ballistic missile; DF-5B, an upgraded variant of its legacy DF-5 intercontinental ballistic missile.\textsuperscript{38} The 2015 strategy highlighted the role that missile defense would play, stating that the PLA Second Artillery Force would leverage new technology advancements to develop a new force structure that includes both nuclear and conventional capabilities. It will “strengthen its capabilities for strategic deterrence and nuclear counterattack, and medium- and long-range precision strikes,” the document stated.\textsuperscript{39}

China’s effort to modernize its military and improve its stock of missile defense systems coincides with its push to assert dominance in the East and South China Sea. With multiple countries vying for sovereignty in these areas, Beijing’s interest is not new. However, China increased its activities in these seas during this time, sparking new international concerns over Beijing’s intentions. In the Office of the Secretary of Defense’s 2016 annual report, analysts noted that in 2015 Beijing was challenging Japan’s claim to the Senkaku Islands by deploying additional maritime law enforcement ships. Between 2014 and 2016, China was reported to have


reclaimed over 3,200 acres of land in the southeastern South China Sea and built additional military installations on the Spratly Islands. This would allow the state to increase its influence

**Significant Events in the South China Sea**

**1947** China publishes a map with the “nine-dash line” to claim waters adjacent to Malaysia, the Philippines and Vietnam.

**October 2011** US Secretary of State Hillary Clinton says the U.S. is shifting its foreign policy to focus more on Asia

**March 2012** China detains 21 Vietnamese fishermen in the Paracel Islands, accusing them of illegally fishing in Chinese waters.

**April 2012** The Philippine navy finds Chinese fishing boats near Scarborough Shoal, with illegally harvested coral.

**June 2012** Vietnam claims sovereignty over the Spratly and Paracel Islands

**September 2012** Philippine President Benigno Aquino publicly states that the country’s western maritime territory has been renamed the West Philippine Sea

**December 2012** China submits claims to the East China Sea to the UN after Japan buys the Senkaku/Diaoyu Islands

**November 2013** China announces an air defense identification zone in the East China Sea. China states it can monitor aircraft flying in the area. The US flies two jets through the area.

**December 2013** The USS Cowpens almost collides with a PLA ship in the South China Sea

**January 2014** China’s implements rules requiring foreign fishing crews to obtain a permit before entering a large portion of the South China Sea to fish.

**April 2014** US President Barack Obama signs the US-Philippines Enhanced Defense Co-operation Agreement to allow the US to conduct rotations with the Philippine navy.

**May 2014** China moves a China National Petroleum Corporation oil rig near the Paracel Islands. Anti-Chinese protests begin in Vietnam that focuses on damaging businesses with ties to the rig. China removes the rig from the area in July.

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40 “Annual report to congress,” 2016 i.
in the area and “harness a portion of the sea for its own use that had been relatively out of reach.”

Developing a hypersonic weapon system would greatly benefit China’s desire to maintain superiority in the East and South China Seas during this time. By improving its anti-access/area-denial capabilities, these weapons could be used to target United States Navy bases and ships, which may explain why it has concentrated on developing and fielding advanced precision strike missiles in the 2015 strategy. Hypersonic weapons would provide Beijing with short-term

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benefits in this regard; because of their low trajectories, it has been suggested that they are generally less vulnerable to traditional ballistic missile defense systems.\textsuperscript{43} Additionally, although the literature suggests that Beijing wants to first use hypersonic glide vehicles as a theater-range weapon, it may use extended ranges to later gain international and global superiority.

China continued to work on the development of its DF-ZF weapon system after the release of this military strategy by conducting three tests in 2015 and one test in 2016, all of which were reportedly successful.\textsuperscript{44} In 2016 it was reported by \textit{Business Insider} that the system could possibly be fielded by 2020, with a powered variant fielded by 2025.\textsuperscript{45} The weapon is said to be maneuverable enough to target ships and steer clear of missile defense systems.\textsuperscript{46}

Beijing also began to conduct development tests of a Dongfeng-17 equipped with a hypersonic glide vehicle in 2017.\textsuperscript{47} The first 2017 test occurred November 1, during which the missile reached a range of 1,400 kilometers. The second occurred 14 days later on November 15. United States analysts classified the weapon as a medium-range platform with an estimated range between 1,800 and 2,500 kilometers. This range would potentially allow China to reach South Korea and Japan.

\textsuperscript{51} \textsuperscript{44} Nurkin, Tate, Kelly Bedard, James Clad, Cameron Scott, and Jon Grevatt. “China’s Advanced Weapons Systems.” \textit{China’s Advanced Weapons Systems}, n.d. 187
\textsuperscript{46} https://missiledefenseadvocacy.org/missile-threat-and-proliferation/missile-basics/hypersonic-missiles/
If fielded, the DF-17 would provide China with multiple strategic advantages. Specifically, it would equip the People’s Liberation Army Rocket Force with a system that would be difficult to target with the United States’ Terminal High Altitude Area Defense System and Japan’s Aegis Ashore installations because of its low trajectory.\(^{48}\) Additionally, China does not seem intent on developing these weapons for offensive operations; rather, it seems to be developing them to deter adversaries from interfering in the East and South China Seas. In 2018, China was the only country known to be actively taking steps to deploy hypersonic weapons. This was unlike the United States and Russia, which only seemed to be pursuing these weapons under research and development efforts.\(^{49}\)

Additionally, China in 2019 unveiled that it is also working on a hypersonic weapon dubbed Xingkong-2. According to state media, the weapon was tested in 2018, although additional details about the system are scarce. In December 2019, the weapon was still in its trial phase.\(^{50}\)

Although the complete breakdown of Beijing’s defense budget is not publicly available, literature shows that China’s overall military budget has gone up in recent years. According to Michael Griffin, the Pentagon’s undersecretary of defense for research and engineering, China’s defense budget has doubled in the last decade.\(^{51}\) Additionally, the Defense Department’s 2019


\(^{49}\) Panda.


\(^{51}\) U.S. Congress, House, Armed Services Committee’s subcommittee on intelligence and emerging threats and capabilities, FY2020 science and technology posture hearing, statement of Michael D. Griffin, undersecretary of defense for research and engineering.
annual report to Congress, “Military and Security Developments Involving the People’s Republic of China 2019,” states that China’s military budget is projected to go up by an annual average of 6 percent. By this estimate, the total budget would be $260 billion by 2022. Authors of the report predict that should Beijing remain on this steady trend, “China will remain the largest spender in the Indo-Pacific region besides the United States.”

_Cultural Influences on China’s Strategic Decisions_

Adamsky stated that countries’ military strategies for conventional weapons are highly influenced by cultural norms. Because of this, it is important to examine how Chinese culture has played a part in how it chooses its weapons systems. China has developed a strategic culture based on a suspicion of foreign intentions, much of which has stemmed from its “century of humiliation.” Following a loss to the British in both the 1840-1842 Opium War and the Second Opium War 1856-1860, the Chinese lost national sovereignty and soon lost to the Japanese during the 1894-1895 Sino-Japanese war. These events sparked a resistance to foreign influences, as evidenced by the 1900 Boxer Uprising. Multiple events such as these are often referred to as China’s “century of humiliation,” which has culminated into the country’s push to establish itself as a major power.

This focus on nationalism was also reflected in China’s strategic culture before it began hypersonic weapons development and has always been a strong influence in its weapons decisions. For instance, Robert Ross notes that China has let nationalism shape its maritime development.

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defense policy following the end of the Cold War, noting that the government had soon pushed to develop an aircraft carrier and a navy capable of operating globally, both of which are “traditional symbols of great power status.” Chinese Navy Commander Adm. Liu Huaqing had advocated for the carrier starting in 1986. 54 This helped to gain increasing interest in building the vessel into the early 2000s. This was one idea out of many prestige projects — at the time, the Chinese were also pursuing large-scale projects such as the Three Gorges Dam, previously known as the largest dam in the world, and a high-speed train from Shanghai to Beijing. Following this interest, the country’s first aircraft carrier, the Liaoning, was commissioned as a training ship in 2012.55

This nationalist attitude is also tied to President Xi Jinping’s vision for a “great rejuvenation of the Chinese nation.”56 His goal was to transform the state into a great power by 2049 and a moderately prosperous state by 2020. This attitude further influenced a push to improve the China’s military capabilities, which not only included improving its navy and air force, but also investing into emerging capabilities such as artificial intelligence. Patricia Kim of the Pacific Council notes that since Jinping took office in 2012, China has increased its presence in the East and South China Seas by constructing military posts in the Spratly Islands and adopting additional anti-ship missiles and surface-to-air missiles.

54 Ross, 60.
United State hypersonic weapons development:

The hypothesis is that China and Russia began to develop their own hypersonic weapons programs in response to those of the United States. Because of this, it is important to examine the development efforts of the United States.

It seems that the United States’ first most notable effort to begin exploring hypersonic weapons is Project Bumper, which consisted of launching a rocket past Mach 5 in 1949 to become “the first object of human origin to achieve hypersonic flight.” The U.S. Army effort relied on a V-2 rocket with a WAC Corporal rocket on top, allowing it to reach hypersonic speeds. However, since then, the United States has not made significant progress towards potentially fielding hypersonic weapons, and it is far from reaching procurement but continues to explore ways to overcome hypersonic flight challenges such as high temperatures and high air speeds.

But the United States has begun recognizing the hypersonic weapons development efforts by near-peer adversaries Russia and China in recent years and has increased its efforts to field hypersonic glide vehicles and hypersonic cruise missiles. Multiple national security officials have publicly expressed concern about the issue, lamenting that the United States’ own efforts are behind and have only been in the research and development phase. For instance, William Roper, Assistant Secretary of the Air Force for Acquisition, Technology and Logistics, noted in

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December 2019: “China and Russia made hypersonic weapons a national priority. We didn’t. Every service now has a major hypersonics program in a departmentwide effort to catch up.”58

Right now, these efforts are still in their research and development phase, according to the available literature and news reports on the topic. Some notable systems include those being researched by the Air Force and the Defense Advanced Research Projects Agency, which such as a hypersonic air-breathing weapon and a tactical boost-glide system. According to National Defense Magazine, these have been in development since 2012 and may take first flight in 2020.59

The United States’ major hypersonic weapons research and development programs include:

- U.S. Navy—Conventional Prompt Strike (CPS);
- U.S. Army—Long-Range Hypersonic Weapon (LRHW);
- U.S. Air Force—AGM-183 Air-Launched Rapid Response Weapon (ARRW, pronounced “arrow”);
- DARPA—Tactical Boost Glide (TBG);
- DARPA—Operational Fires (OpFires); and
- DARPA—Hypersonic Air-breathing Weapon Concept (HAWC, pronounced “hawk”).


Additionally, the U.S. Army is working on a long-range hypersonic weapons, defined as “a new class of ultrafast, maneuverable, long-range missiles that will launch from mobile ground platforms.”\textsuperscript{61} The service directed the acceleration of such a system in March this year, setting a requirement to deliver a prototype by fiscal year 2023.

This push to invest in hypersonic weapons is reflected in President Donald Trump’s fiscal year 2020 budget. Griffin said in March during testimony before the House Armed Services Committee’s subcommittee on intelligence and emerging threats and capabilities, that the request includes $2.6 billion for all hypersonic weapons-related research. $157.4 million of that request is geared towards hypersonic defense programs, he noted.\textsuperscript{62}

Discussion:

By looking at the relevant dates, it seems that China did not begin developing these capabilities in response to the United States’ hypersonic weapons. As previously noted, China’s most significant push to develop these systems did not occur until 2014 with the first flight test of the WU-14, although the United States had begun looking at the capability since it launched Project Bumper in 1949. The United States’ results were poor and have appeared to take a backseat to developing more conventional capabilities since then. It seems unlikely that China and other countries would have been particularly threatened by the United States’ efforts, which were far from being fielded.

\textsuperscript{62} U.S. Congress, House, Armed Services Committee’s subcommittee on intelligence and emerging threats and capabilities, FY2020 science and technology posture hearing, statement of Michael D. Griffin, undersecretary of defense for research and engineering.
Instead, China’s motivations to develop hypersonic weapons capabilities appears to be part of a larger effort to gain and maintain superiority in the South China Sea, which would be consistent with its security model. Beijing began developing these systems around the same time it released its 2015 military strategy, which highlighted its motivation to protect maritime assets by improving the military’s long-range precision strike capabilities. Beijing outlines its reasoning behind this strategy, noting that “some of its offshore neighbors take provocative actions and reinforce their military presence on China’s reefs and islands that they have illegally occupied” and that “some external countries are also busy meddling in South China Sea affairs.”

Hypersonic weapons fall under the category of long-range precision strike capabilities, and strategically these weapons would help Beijing gain superiority over forward-deployed bases and ships without being easily detected because of their low trajectory. With a medium-range hypersonic system, Beijing would easily be able to target neighbors such as South Korea and Japan without becoming vulnerable to United States missile defenses, such as the Terminal High Altitude Area Defense system. At the same time in 2015, China introduced or fielded other missile systems that could complement these capabilities, highlighting its desire to improve its fires capabilities. Since then, China has also taken additional steps to increase its military research and development by developing wind tunnels that would help researchers test new weapons and technologies, such as different configurations of scramjet engines.

It is also notable that there have not been reports outlining a desire to greatly extend the range of these hypersonic weapons, suggesting that China is currently not interested in using...
these platforms for global dominance. This suggests that Beijing only seems interested in using these systems for the Pacific theater, although its later priorities could be focused on extending its influence on other areas.

While China appears to have advanced capabilities, literature suggests that it must still overcome challenges before it can field these systems on a wider scale. A May 2018 report in Jane’s by IHS Markit titled “China’s Advanced Weapons Systems,” notes that it is not enough to have the missiles themselves. To be fully fieldable and successful, they also need a large network of support infrastructure. Some of this infrastructure includes navigation technologies and reliable data networks. “Should China be able to combine these capabilities, it will have a weapons system with the potential to destabilize and arguably reshape regional and global security dynamics,” the report states. A hypersonic glide vehicle “will provide a leap forward in regional defense and increase the range of the missile.”64

Acton in 2013 also makes note of challenges that China must face.65 Specifically, it must overcome technical challenges such as how it would hone in on a particular target when traveling at high speeds. Relying on terminal honing, he notes, would be difficult without continuous midcourse navigation. Because of challenges such as these, China may not be as ahead in hypersonic weapons development that some would believe. The status of China’s hypersonic weapons is significant because it shows that they have increased their development over time.

When examining hypersonic weapons as a conventional system, Adamsky’s work on cultural influences can be applied. As previously noted, China’s military strategy has been

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64 Nurkin, 179.
largely influenced by a cultural resistance to foreign intervention following the “century of humiliation.” Based on information from previous sections of this paper, it seems as though China began to invest in hypersonic capabilities after there was both an increase in foreign interest in the South China Sea and after President Jinping established a vision for improving its status as a great power.

Additionally, hypersonic weapons seem to be a prestige project, similar to how the government pursued the aircraft carrier. This is evidenced by the DF-17’s presence in a military September 2019 military parade. These weapons have made multiple appearances in state-run Chinese publications such as the China Times and the Global Times, suggesting that Beijing wants recognition from other countries.

Due to China’s cultural resistance to foreign intervention, it seems reasonable to suggest that Beijing became interested in developing weapons that would be suitable for countering foreign intervention in the South China Sea. Strategically, these weapons would be ideal for this purpose because they would be ideal for countering forward deployed naval ships and bases in this region.

Conclusion:

Hypersonic weapons developments are receiving more attention than ever by Defense Department and government officials over the past year, as evidenced by media reports and Congressional testimonies. But further examination of the of China’s weapons development

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programs have shown the hypothesis to be incorrect, showing that Sagan was right in that “different historical cases are best explained by different causal models,” and that China seems to have different motivations behind its interest in hypersonic weapons. China has been actively working to deploy hypersonic capabilities, with its most notable effort including three flight tests in 2014. United States officials have noted that the U.S.’ own efforts seem to be far behind, with major projects remaining in the research and development phase and have yet to transition to official programs of record. This suggests that China is not acting in response to United States’ hypersonic weapons technologies.

The hypothesis is flawed in that it was focused too much on Sagan’s security model. Although the model is relevant because hypersonic weapons represent a new type of threat, there are other considerations to take into account. Instead, Sagan’s norms model appears to be more applicable. China’s fervent nationalism suggests that it is developing hypersonic weapons as a prestige projects, similar to how it pursued the development of an aircraft carrier in the early 2000s.

Additionally, China has a history of resisting foreign intervention. China’s first hypersonic weapons development projects kicked off during a time in which Beijing was also trying to establish itself as a powerful presence in the South China Sea and counter other countries expanding in the area. This leads this paper to come to two main conclusions. Beijing seems to be interested in hypersonic weapons development in order to prevent foreign intervention in the South and East China Seas and establish itself as a global military power. Moving forward, it would be beneficial to examine additional information on China’s domestic bureaucratic interests to see if Sagan’s domestic politics model would be applicable.

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67 Sagan, 85.
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Curriculum Vita

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