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China's Hypersonic Weapons: Implications for Deterrence and Crisis Stability

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SYNOPSIS

China's military modernisation has seen it develop a range of new capabilities, including hypersonic weapons. The danger is not in the weapons, per se, but Beijing's radically different approach to crisis stability and concept of deterrence. The confluence of these elements creates a much greater potential for misunderstanding and strategic instability.

COMMENTARY

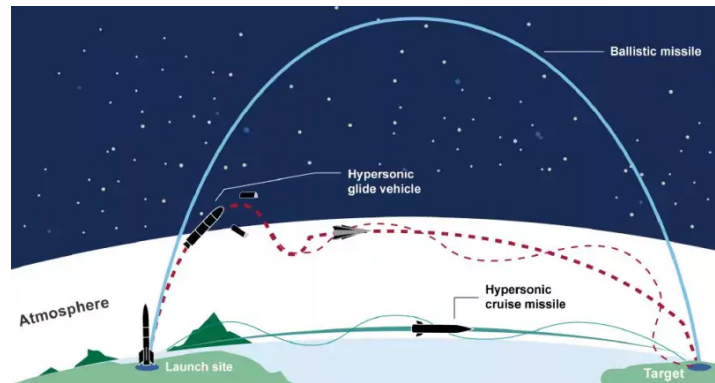
Late last year, news of a Chinese hypersonic weapons test emerged. The test, which was reportedly conducted in July, was described in breathless terms. Some characterised it as a "new Sputnik moment", referring to the orbiting of the first artificial satellite by the Soviet Union in 1957.

The Soviet Union's ability to launch a satellite before the United States marked the end of American confidence that it could rely on the expanse of two oceans to keep it safe. But even more stunning was the reality that Soviet scientists and research had outpaced the United States. The "Sputnik moment" was a crisis in American self-confidence, not simply an elevation of military threats.

What Are Hypersonic Weapons?

Ironically, then, much of the American reaction to the news of the Chinese hypersonic test has been focused on the military implications and has arguably been misplaced. Vehicles are considered "hypersonic" if they exceed Mach 5 (five times the speed of sound or approximately 6,174 km per hour or 1.6 km per second). Notably, the

warheads of most intercontinental ballistic missiles (ICBMs), and even some vehicles such as the now-retired Space Shuttle, go much faster than Mach 5. [A typical ICBM](#) warhead, for example, will have a speed of around Mach 20 in its mid-course phase, and around Mach 10 after it [initially re-enters](#) the atmosphere. The Space Shuttle, at re-entry, [reached speeds](#) of nearly Mach 25.



The distinction between ballistic missiles, cruise missiles, and hypersonic weapons. *Reprinted with permission from U.S. Government Accountability Office (GAO). The use of GAO visual information does not imply or constitute GAO endorsement.*

The hypersonic vehicles in the news travel more slowly, but can manoeuvre radically. These vehicles fall into two categories: hypersonic glide vehicles (HGVs) are typically launched by ballistic missiles; [hypersonic cruise missiles](#) use high-powered engines to reach high speeds. Both usually incorporate wings or other control surfaces, which allow them to jink from side to side and even “pop up”, while nonetheless able to achieve high accuracy against a given target. This makes them very different from ICBM warheads, which, while faster, follow a ballistic trajectory, a parabolic arc, that can be somewhat modified with fins during re-entry, but are much more predictable. The hypersonic vehicle’s manoeuvres allow it to potentially evade an adversary’s defences such as anti-ballistic missile systems and potentially even advanced anti-aircraft systems such as AEGIS and Patriot.

Research into hypersonic vehicles has been underway for decades. In 1967, American pilot William Knight reached Mach 6.7 in an [X-15 rocket plane](#). Various nations have since tested hypersonic vehicles, including not only the United States and China but also Russia and India. The Chinese testing of a hypersonic vehicle, then, in and of itself should not have been seen as the equivalent of the strategic surprise that marked Sputnik. Indeed, since China already fields ICBMs, it has long had the ability to reach American cities with nuclear fire, so the Chinese test of a hypersonic vehicle should not be seen as altering the strategic balance.

China’s Hypersonic Test: Radically Different

As more information has emerged, however, the nature of the Chinese test has become clearer; it is in these new details that worrisome elements emerge, arguably sufficient to mark the kind of strategic and political change that occurred in 1957.

In the first place, the Chinese hypersonic vehicle **went into orbit**. American defence officials have confirmed that the [Chinese vehicle circled](#) the globe at least once. This means that the Chinese have openly tested their hypersonic platform as a potential orbiting weapons system.

Both the United States and the Soviet Union had the ability to deploy “fractional orbital bombardment systems” or FOBS. In essence, FOBS would allow a nation to fire nuclear warheads into orbit, then bring them down from unexpected angles (the most commonly discussed being from the southern hemisphere). Not only would this capacity “outflank” missile defences, but it would also potentially make every satellite a nuclear weapons carrier, and every orbital launch a potential weapons launch. This would, of course, pose a grave threat to crisis management. If a nation launched vehicles into orbit during a crisis, would it be supplementing its surveillance and communications networks, or deploying FOBS? To improve crisis stability, both superpowers chose to forego this capability.

Notably, when the Chinese were confronted with their hypersonic test, they denied that it was a weapon, describing it instead as a “[space vehicle](#)”.

It should be noted that the Chinese need not base such a system in space (which would potentially constitute a violation of the 1967 Outer Space Treaty if the system had a nuclear warhead). The test of an orbital capability means that the system would not be “based” in space, but might simply go into one or several orbits before engaging a target.

Or potentially several targets. Additional details about the Chinese HGV test last year indicate that Chinese engineers further developed the platform, so that it reportedly launched a missile or other vehicle while engaging in [hypersonic flight](#) in the atmosphere. This would constitute a major achievement, since the release of any kind of additional vehicle while flying through the air (as opposed to the vacuum of space) would occur under extremely trying conditions. The high speed of a hypersonic vehicle means that any hatch or bomb bay door that opened would be subjected to massive buffeting, which might tear the hatch or door off. If the hypersonic vehicle was carrying an external payload, the attaching pylons would experience similar buffeting.

Furthermore, spacecraft and ICBMs have seen a layer of plasma form around the vehicle during atmospheric re-entry. The high speed of the vehicle and the attendant compression of the atmosphere in front [ionises atmospheric gases](#). This plasma has interfered with communications to the Space Shuttle and other spacecraft. It is not clear how this might affect a separating payload from the hypersonic vehicle. That the Chinese were able to overcome these challenges displays both the degree of effort underlying the Chinese hypersonic effort and their ability to innovate, often in ways that are radically different from the expectations of their Western counterparts.

Implications for Crisis Stability

Regardless of how it works, this Chinese subsidiary payload also underscores the very different view Beijing has about crisis stability. It is unclear, from the available reporting, [what this payload was](#). It may have been a test of a smaller, independent warhead; it may have been a decoy or other countermeasure. But such a system, deploying while travelling hypersonically, gives it the potential to strike multiple targets with less warning time, and while degrading any defences that might be available.

In either case, the combination of an orbital (versus suborbital) flight plan and the ability to field a subsidiary payload means that the PRC now fields capabilities that

pose very different threats to the United States and the West than did the Soviet Union. Equally important, those capabilities appear to reflect a strategy that is far less concerned with reassurance and stability than was the case with the superpowers, especially after the Cuban missile crisis.

As the PRC modernises its strategic nuclear capabilities with an array of systems, including both fixed and land-based ICBMs, additional ballistic missile submarines, and a new strategic bomber, it would behove both Washington and Moscow to consider how Beijing views strategic stability, and how that view is likely to affect global security. The recent hypersonic test gives little reassurance.

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