The Missiles of August

The Lebanon War and the democratization of missile technology

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C-802 Noor anti-ship missile

ZelZal-2 long-range artillery missile

The events of September 2001 disproved the assumption that only a state could make war on another state. Now Hezbollah's confrontation with Israel has provided further education about how the world is changing. Hezbollah's campaign is a clear sign of how the democratization of missile technology – cruise missile technology, in particular – is reshaping global realities.

Assumptions about the Israeli Defense Force's military superiority have enjoyed axiomatic status, especially among laypeople. In fact, the IDF were – and perhaps still are – a good citizen-soldier militia, with a small number of units of excellent professional soldiers, and a highly capable general staff. According to a famous, and probably apocryphal story, when asked the secret of Israel's military successes, an Israeli commander succinctly summarized the IDF's method: "Always fight Arab armies."

However, as Hezbollah's leader, Sheikh Hassan Nasrullah, has explained: "We are not a regular army and we do not use the way of a regular army." Hezbollah has displayed a combination of a guerrilla force's decentralized flexibility and a national military's sophistication, fielding weapons like the C-802 Noor radar-guided anti-ship missile (an Iranian-made knockoff of the Chinese

"Silkworm" C-802) that struck an Israeli warship on July 14. In sum, Hezbullah's arsenal includes the following missiles:

· 122mm Katyushas: range 13 miles, warhead 6 kg
· 122mm improved Katyushas: range 19 miles, warhead, 6 kg
· 220mm Syrian rockets: range 43 miles, warhead 40 kg
· 240mm rockets: range 6 miles, warhead 18kg
· 240mm Iranian Fajr 3: range 26 miles, warhead 50 kg
· 333mm Iranian Fajr 5: range 46 miles, warhead 90 kg
· 302mm Iranian Khaibar-1: range 100 miles, warhead 100 kg
· 610mm Iranian ZelZal-2: range 130 miles, warhead 400 kg

Significantly, according to claims by both Hezbollah and Israel, Hezbollah has held in reserve all of its 200-odd Zelzal-2 missiles, which have a range of up to 200 kilometers – capable of reaching Tel Aviv. The Zelzal missiles are road-mobile, solid-propellant systems, about which little is known. They are most likely unguided or use a rudimentary inertial system; when properly launched, such rockets would be accurate to within several kilometers of their target, enough to hit a city like Tel Aviv.

Given all that, it's a reasonable supposition that Sheikh Nasrullah and Hezbollah were ordered by their Iranian backers to keep in reserve the Zelzals, as well as a significant number of the Iranian Fajr-5 missiles (of which the Khaibar-1 is believed by many analysts to be a modified variant).

Hezbollah's Katyushas are the furthest thing from the latest designs. Predating venerable weapon systems such as the AK-47 assault rifle and B-52 bomber, these generic short-range rockets were given their name by the Soviet troops who first fired them at German forces during World War II.

For all the Katyusha's vintage provenance, however, it has defeated futuristic attempts at missile defense like the Tactical High Energy Laser (THEL), a U.S.-Israeli attempt to create a high-energy chemical laser that could detonate the missiles in midflight. In fact, it's indicative of the difficulties of short-range missile defense that the THEL prototype was approximately the size of six city buses; according to Subrata Ghoshroy, a military analyst at MIT who studied the project in 1996, not only would the system have been "a sitting duck" on a battlefield, but also any fractures of its fuel tanks would have released potentially deadly gas over its crew and bystanders. Although in 2000 the THEL was able to shoot down two Katyushas simultaneously during tests when no cloud cover impeded it, Katyusha rockets were designed to be fired from truck-mounted launchers in barrages of up to 50. Given the THEL's general impracticality, the U.S. Army ceased funding it in late 2004.

What are the possibilities for missile defense against the longer-range, Iranian-built rockets, such as the Fajr-3 and Fajr-5, with which Hezbollah hit Israel's third-largest city, Haifa, and as far south as Hadera in central Israel?

Since the 1950s, when *Time* magazine printed artists' depictions of the majestic umbrella-shaped shields that would be created by the Pentagon's anti-missile missiles as they intercepted Soviet ICBMs over American cities, the U.S. military has kept promising that whatever ABM (anti-ballistic missile) system was then under development, was just a step or two from being perfected. Simultaneously, it has allowed fudged tests in order to get favorable results, and ignored the fact that, even if the technology worked perfectly when deployed, such systems would be vulnerable to countermeasures that would be cheap and easy for attackers to employ.

In 2006, the best hope for tactical missile defense remains the latest iterations of the Patriot interceptor. First deployed in the first Gulf War, the U.S. military initially claimed that this surface-to-air missile had shot down more than 40 of Saddam Hussein's Scuds. In 1992, however, the Government Operations Committee of the U.S. House of Representatives concluded (.pdf file) that the Army had no proof that *any* Patriot had shot down *any* Scuds. The latest Patriot versions seem to be more effective, with at least eight independently confirmed tactical missile hits in the 2003 Iraq War.

Israel, with the United States, has spent billions on a two-tier ABM system that combines Patriots with Arrow rockets, a homegrown Israeli system. Nevertheless, although Patriot batteries have been set up around Haifa, Israel launched none in the recent conflict with Hezbollah. That's because Patriots cost $1 to $3 million, the Arrow interceptors are similarly expensive, and the supply of both, whether or not they hit incoming Hezbollah rockets, would soon run out – as with the THEL system, both economics and physics favor the attacker's rockets.

On the ground, Hezbollah has been able to move its rocket launchers rapidly. Indeed, Hezbollah's battlefield agility and flexibility is one of the most striking features of the recent conflict. Objections that Hezbollah has accomplished a "victory" only in that its obdurate resistance has vast propaganda value within the Arab world miss the point that a militia of some 3,000 fighters impeded the advance of what was supposedly one of the world's best armies beyond a few kilometers inside Lebanon. In the process, more than 20 Israeli Merkava tanks – again, reputedly the world's best – were damaged by anti-tank weapons, including the Russian-made RPG-29, which have a tandem warhead so that the first explosion blows away a tank's protective shield and the second penetrates it.

Overall, Hezbollah's decentralized, flexible network of small units exhibited the essential aspects of a warfighting style that some military thinkers have predicted would predominate in 21st-century warfare, and which has been described as netwar or fourth-generation warfare. It's a style of warfare that armies of nation-states, with their massive levels of force, are ill-equipped to fight.

One proponent of this school of thought, John Arquilla, a professor at the U.S. Naval Postgraduate School, has argued: "What happens if you take your large hammer to a ball of quicksilver? That's what these networks are." He continues: "We are trying to wage war as if it still mattered that our forces are comprised of 'the few and the large' – a few large heavy divisions, a few large aircraft carrier battle groups – when in fact war is migrating into the hands of the many and the small – little distributed units. We live in an era when technology has expanded the destructive power of a small group and the individual beyond our imaginations."

These lessons of combat – now exemplified by Hezbollah's resistance to the IDF – are not being lost elsewhere in the Arab world. According to a UPI story, "Anti-tank Rockets Menace Israelis," appearing on August 14, the day of the cease-fire, a reporter from the Israeli paper *Ha'aretz* recently interviewed a member of Fatah's al-Aksa brigades in Bethlehem, who said: "The brothers…are no longer interested in games with Kalashnikov rifles; they want anti-tank rockets….When this technology arrives, how difficult would it be for one of the fighters to sit on the Palestinian side of the wall at Abu Dis and fire a rocket at the King David Hotel? With less effort than a suicide bombing or shooting one can fire a missile and get the same results."

But not only this level of missile technology is being democratized. As the instance of the Iranian-made, radar-guided, anti-ship missile that hit the Israeli corvette illustrates, more sophisticated missile technology is also spreading. Pakistan, China, North Korea, and Iran, among others, now

possess cruise missiles. The United States and its allies are now urging a U.N. resolution that will call for international sanctions against Iran.

To enforce such sanctions would require control of Iran's offshore waters and particularly of the Straits of Hormuz, through which much of the world's oil moves and where Iran can potentially destroy all shipping. It's not inconceivable to many analysts that Iran, with the missile technology it now possesses, could 'take down' that foremost example of U.S. military power, the aircraft carrier battle group. In a world of proliferating cruise-missile technology, one Pentagon consultant told me: "We have a navy full of ships that will burn to the waterline when hit."

(Next week, in the second part of this article, we will analyze the implications of this democratization of cruise-missile technology.)