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How a Simple Ratio Came to Influence Military Strategy

Russia may have placed too much faith in 'force ratios' in its invasion of Ukraine

By *Josh Zumbrun* [Follow]
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Early in Russia's invasion of Ukraine, it wasn't just Moscow that believed its offensive could succeed quickly. In February, even U.S. officials warned Kyiv could fall in days.

Russians had numbers on their side, or more precisely a number: the 3:1 rule, the ratio by which attackers must outnumber defenders in order to prevail. It is one of several "force ratios" popular in military strategy. Russia, it seemed, could amass that advantage.

The war in Ukraine has brought renewed interest in force ratios. Other ratios in military doctrine include the numbers needed to defeat unprepared defenders, resist counterinsurgencies or counterattack flanks. Though they sound like rules of thumb for a board game like Risk, the ratios have been taught to generations of both American and Soviet and then Russian tacticians, and provide intuitive support for the idea Ukraine was extremely vulnerable.

"I would imagine that most of them are thinking in those terms, that you need something on the order of a 3:1 advantage to break through," said John Mearsheimer, a University of Chicago professor whose work focuses on security competition between great powers. "It's clear in this case that the Russians badly miscalculated."

According to 'force ratio' rules of thumb, these are the number of attacking troops necessary to succeed at certain missions:
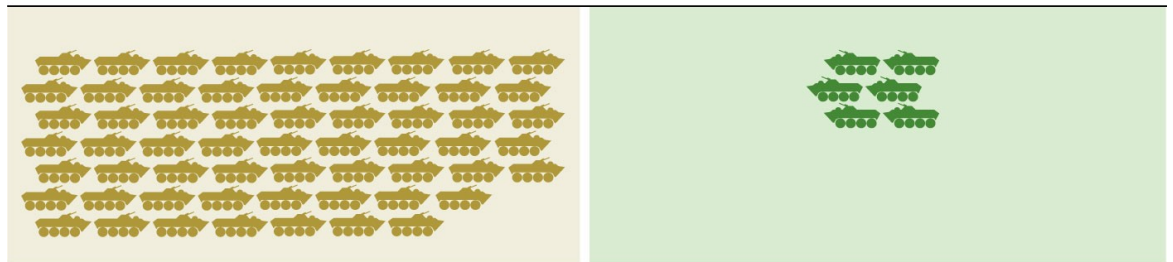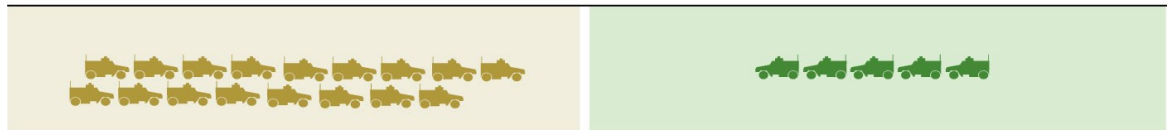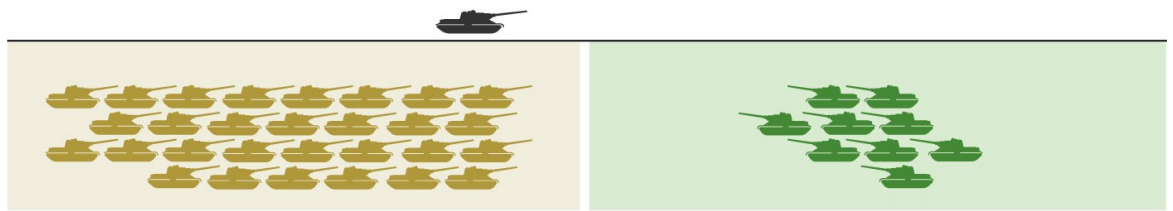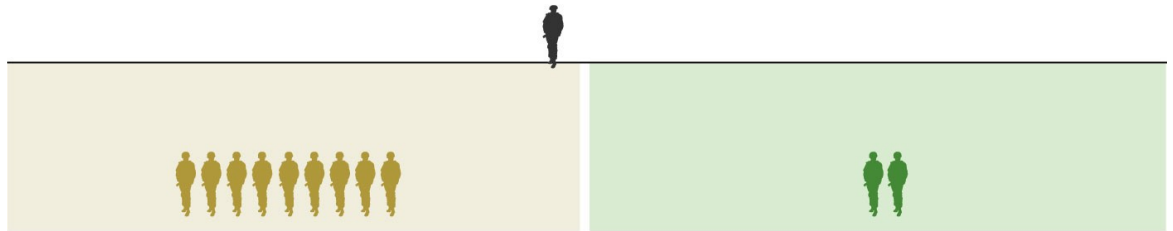
Sources: Army Field Manual 6-0: Commander and Staff Organization and Operations (force ratios);
International Institute for Strategic Studies (Russia/Ukraine forces)
Erik Brynildsen/THE WALL STREET JOURNAL

Modern versions of the 3:1 rule apply to local sectors of combat. A Rand Corp. study determined a theater-wide 1.5-to-1 advantage would allow attackers to achieve 3:1 ratios in certain sectors.

Overall, Russia's military has quadruple the personnel and infantry vehicles, triple the artillery and tanks, and nearly 10 times the armored personnel carriers, according to the International Institute for Strategic Studies, the London-based think tank.

With 190,000 Russian troops concentrated to invade in February, and Ukraine's military spread across the country, (only 30,000 troops, for example, were estimated to be in Ukraine's east near the Donbas region) it appeared Russia had the numbers to overwhelm Ukraine.

Russia's struggles underscore how real wars are far more complex, said Stephen Biddle, a Columbia University professor who served on strategic assessment teams for U.S. generals David Petraeus and Stanley McChrystal in Iraq and Afghanistan.

"The empirical evidence for it is extremely weak," said Mr. Biddle. "It's not some law of science. It corresponds to some degree of intuition, but it's a lousy social-science theory."

Ratios don't account for Western intelligence and materiel support, for Ukrainian resolve, for low Russian morale, for Russia's logistical struggles, or for severe Russian tactical errors, like leaving tanks exposed in columns on major roadways, Mr. Biddle said.

(In planning real combat operations, the U.S. military uses far more detailed analyses than rules of thumb, he said.)

These ratios originate from 19th-century European land wars.

In his seminal 1832 text on military strategy, "On War," the Prussian General Carl von Clausewitz proclaimed: "The defensive form of warfare is intrinsically stronger than the offensive." By the Franco-Prussian War in 1870, Prussians distilled this to requiring triple the attackers. Prussia decisively triumphed; maybe they were on to something.

World War I, with years of stalemate in the trenches as combatants struggled to break through defenses, lent further credibility to the idea.

English Brigadier-General James Edmonds, writing shortly after World War I, recorded an early version of the rule: "It used to be reckoned in Germany that to turn out of a position an *ebenbürtigen* foe—that is, a foe equal in all respects, courage, training, morale and equipment—required threefold numbers."

After World War II, Colonel A.A. Sidorenko promoted the ratio in Soviet military doctrine. The U.S.

incorporated ratios in the 1955 update to the Army Field Manual—America's military doctrine—that umpires used to referee war-game outcomes.

There were skeptics, too. According to <u>a monograph on the ratios' history </u>by Army Major Joshua T. Christian, General of the Army Omar Bradley was one critic, worrying that tacticians were constraining their strategies in deference to overly simplistic rules of thumb. Yet the ratios remain in <u>the U.S. Army Field Manual</u> today.

In the 1980s, the ratios were central to a fierce debate over whether the Soviet-led Warsaw Pact, with superior numbers to NATO in Europe, could sweep to victory in conventional war. On one side, Mr. Mearsheimer argued Soviet-aligned forces would struggle to reach the 3:1 ratio where it counted, and thus <u>could *not* swiftly crush NATO</u>.

He argued then and now that the rule applies narrowly to forces engaged in <u>immediate breakthrough battles</u>. Today, if Russia can amass enough force in one location, he worries, it could punch through the Ukrainian line. Once punctured, the tide can turn rapidly—such as, he said, when Nazis invaded France via the lightly defended Ardennes Forest.

Other scholars, like Joshua Epstein, promoted dynamic mathematical models to assess the military balance. Then a Brookings Institution fellow, <u>he argued ratios were useless</u>, citing examples where defenders or attackers prevailed far outside the ratio.

(For Risk, <u>the math actually is clear</u>: Attackers win most large battles if they have 86% of the defending force, plus two. Just 88 attackers will usually beat 100 defenders; that makes a mockery of the 3:1 rule.)

<u>Before consensus</u> was reached, the Cold War ended. For a happy generation, major European land wars seemed unimaginable. Mr. Epstein turned his mathematical modeling to diseases; he is now an epidemiologist at New York University.

Still, he said of Ukraine: "It's obvious in this case, the force ratio, the number of static units, are a very poor predictor of what's going to happen on the battlefield."

To Mr. Epstein, force ratios exemplify a quip from the writer H.L. Mencken—and a lesson Russia is learning the hard way:

"There is always a well-known solution to every human problem—neat, plausible and wrong."

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This is my first Numbers column after 15 years reporting on the U.S. and global economies. Like previous Numbers columnists, I will examine interesting numbers, their history, how they're created, how they're used, and how they're abused. That Mencken quote, incidentally, sums up my goal—to celebrate numbers when they're neat, to interrogate whether they're plausible, and to always be mindful that even neat, plausible numbers can be wrong.

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