



Nano-Guns, Nano-Germs, and Nano-Steel

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Conflicts, clashes, battles, and wars: this is the stuff of which history is made. The world as we know it today is largely a product of wars fought and peoples conquered.

We like to look back admiringly on other things our species has produced: great works of art, brilliant inventions, sage philosophers, brave explorers, and selfless peacemakers. But the real star of the human story is war. In fact, very often those things we admire—philosophy, technology, leadership, superb writing and speechmaking—are put to maximum use in the service of war.

The story is not yet over. Within our lifetimes, we are likely to witness battles on a scale never before seen. Powered by molecular manufacturing, an advanced form of nanotechnology, these near-future wars¹ may threaten our freedom, our way of life, and even our survival.

Some wars are between opponents of roughly equal fighting ability. As a result, these conflicts tend to drag on, often for years and killing millions, until finally one side emerges victorious. Recent examples include the American Civil War, World War I, and World War II.

Occasionally one adversary will possess huge advantages over the other, in which case the war typically is quite short. A famous instance is the spectacular one-sided victory of Spanish conquistador Francisco Pizarro over the Incan empire in 1532. What makes this story so remarkable is that an army of 80 000 soldiers was overwhelmed and decimated in one day by a force of only 169 men.

Normally we would expect that an aggressor facing such great numbers would be a decided underdog, virtually assured of defeat. Jared Diamond, in his book *Guns, Germs, and Steel*,² analyzes this historic event—clearly a major turning point in the course of human civilization—and describes the elements that gave the Spaniards a stunningly easy victory.

Diamond lists superior military technology based on guns, steel weapons, and horses; infectious diseases; maritime technology; centralized political organization; and writing. These

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¹ Treder, Mike (2005) “War, Interdependence, & Nanotechnology” (*Future Brief*) <http://www.futurebrief.com/miketrederwar002.asp>.

² Diamond, Jared (1997) *Guns, Germs, and Steel* (W. W. Norton, New York).

advantages can be categorized as follows (with items from 1532 in parentheses):

- Battle technology (guns, steel weapons, and horses).
- Physical fitness (infectious diseases).
- Transportation technology (maritime).
- Effective command and control (centralized organization).
- Communications technology (writing).

Looking forward, we can imagine a similar situation: an apparently strong nation, a superpower or empire within their realm, suddenly and overwhelmingly defeated by an adversary with superior technology and other advantages.

Molecular manufacturing—the ability to construct powerful, atomically precise products at an exponentially increasing pace—could provide the tools for a spectacular one-sided victory by an apparent underdog equipped with superior:

- Battle technology (nano-weapons).
- Physical fitness (nano-enabled biotechnology).
- Transportation technology (aerospace).
- Effective command and control (boosted by nano-computing).
- Communications technology (secure worldwide network).

Despite vastly greater numbers, the Incas—the most developed civilization in the Americas—were not able to mount a serious resistance against the advanced technology of Spain.

Could today's most powerful nation, the United States, as easily be conquered by a nano-enabled attacker? This appears possible, if molecular manufacturing does provide for huge gains in all five areas, as many analysts (including this author) believe it will.

No nation lacking the nanotech advantage will be able to resist a foe—no matter how small or weak in conventional terms—that wields the power of molecular manufacturing.³

It is not certain, of course, that large-scale war will occur within the next few decades. But if it does, and if both (or all) sides are nano-enabled, that event could last a relatively long time, and casualties could be in the billions. If, on the other hand, only one combatant possesses the awesome capabilities of nano-built weapons, computers, and infrastructure, that war might be over very quickly, and could leave the victor in total command of the world.

About the author:

Mike Treder is a professional writer, speaker, and activist with a background in technology and communications company management. In 2002, he co-founded the Center for Responsible Nanotechnology (CRN), a non-profit research and advocacy organization. As an accomplished presenter on the societal implications of emerging technologies, Treder has addressed conferences and groups in the United States, Canada, Great Britain, Spain, Germany, Italy, Switzerland, and Brazil.

³ Phoenix, Chris (2003) "Molecular Manufacturing: Start Planning" (*Public Interest Report*, 56:2) <http://www.fas.org/faspir/2003/v56n2/nanotech.htm>.