# Chance of nuclear war is greater than you think: Stanford engineer makes risk analysis

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Professor Emeritus Martin Hellman began his work on the threat of nuclear destruction in the 1980s.

What are the chances of a nuclear world war? What is the risk of a nuclear attack on United States soil? The risk of a child born today suffering an early death due to nuclear war is at least 10 percent, according to Martin Hellman, a tall, thin and talkative Stanford Professor Emeritus in Engineering.

Nuclear tensions in Iran and North Korea are increasing the need to take a long look at how the United States handles weapons of mass destruction, Hellman said.

Auto manufacturers assess the risk of injury to drivers, and engineers

assess potential risks of a new nuclear power plant. So why haven't we assessed the risk of nuclear conflict based on our current arms strategy? Hellman and a group of defense experts, Nobel laureates and Stanford professors are calling for an in-depth analysis.

With more than 25,000 nuclear weapons in existence and the ability to build many times more, the choice is between creating a safer world and having no world at all, Hellman wrote in his paper "Risk Analysis of Nuclear Deterrence."

Weapons from the Cold War still remain, but public concern for nuclear strategy has dissipated, Hellman said. Many of those who do think about it, such as political leaders, say the fantasy of nuclear disarmament is too risky for national defense, he explained.

"People who are saying change is too risky are implicitly assuming that the current approach is risk free, but no one really knows what the risk is if we don't change," Hellman said.

## Hellman's story

Hellman first became concerned about nuclear war in the 1980s when Ronald Reagan became president. Reagan brought the nuclear threat into clearer focus by being honest about fighting plans, Hellman said. Also, a fellow Stanford professor, Harry Rathbun, started a group to convince people that nuclear weapons represented more than just scientific progress, but a real threat of global destruction. Hellman credited his wife, Dorothie, for getting him to join the group: "I never would have gotten involved if it wasn't for her."

In 1982, Hellman took an 18-month, unpaid leave from Stanford to work as a volunteer for the group started by Rathbun. During this time, Hellman became convinced that nuclear destruction not only could

happen, but would happen unless we changed some of our fundamental beliefs about national security and war.

## Hellman's numbers

About fifteen years after Hellman became convinced of impending destruction, he began punching numbers to calculate the probability of such a catastrophe based on events focused around the Cuban Missile Crisis of 1962. According to Hellman's numbers, the risk of a person not living out his or her natural life because of nuclear war is at least 10 percent.

Hellman gives another analogy: "The risk that each one of us dies as a result of failed deterrence is thousands of times greater than the risk you would bear if a nuclear power plant were built right next to your home."

Determining such a risk seems a little like predicting the future, but Hellman is confident about his numbers. He justifies his probability by breaking down a catastrophe into a sequence of smaller failures, incorporating expert opinions, examining history and estimating within a range of numbers.

## Hellman's path to risk assessment

Before returning to Stanford from his volunteer leave, Hellman started a project with the Soviet Academy of Sciences through a committee led by Evgeny Velikhov, who later became Mikhail Gorbachev's science advisor. In 1984, Hellman and his wife traveled to the Soviet Union to create dialog and build relationships with the Soviet scientists. Soviet restrictions on free speech prevented totally open discussion, but by 1986, Gorbachev lifted censorship, and the project became possible, Hellman explained.

The fruit of their labor came a year later in the form of a book called Breakthrough: Emerging New Thinking. It had the radical thesis that either humanity would end war or war would end humanity.

But the cold war faded, along with public support, and Hellman focused his work on easing ethnic tension on campus (for which he won three awards) before retiring in 1995. After a few years of attending to family responsibilities, he returned to his work on risk assessment.

## Hellman's method

Hellman used a risk analysis approach, which breaks down a catastrophic event into a sequence of smaller failures. He further simplified the analysis by only considering failures triggered by a crisis involving Cuba. He began by evaluating three events that could have initiated a conflict: deploying American missiles in Turkey (which began in 1961), re-imposing a naval blockade around Cuba (which was threatened in the 1980s) and installing a missile defense system in eastern Europe, a current project that has drawn objections from Russia.

Based on the outcomes of these events, Hellman estimated these numbers:

• Rate of initiating events: six percent per year
• Probability that an initiating event leads to a major crisis: 33 percent
• Probability that a major crisis leads to the use of a nuclear weapon: 10 to 50 percent

The third probability is hardest to estimate because we have yet to drop a bomb on Russia (or vice versa). Hellman used the 10 to 50 percent range based on studying what transpired in the Cuban Missile Crisis and on statements by the participants. People can make irrational decisions when under the gun, he explained. Once a major crisis erupts, it

becomes a question of who will back down first; like a game of nuclear chicken, he said.

## Iran and North Korea

Iran's nuclear program and North Korea's nuclear testing add complexity to the assessment, Hellman explained. Nuclear terrorism was not included in the preliminary analysis, which makes Hellman's probability more conservative. Factoring in nuclear terrorism adds a scary new dimension with additional risk, he said. A country with nuclear weapons and a terrorist presence could trigger a nuclear war, especially if the terrorist hostility is directed at a United States or Russian city, Hellman explained.

"If New York or Moscow went up in smoke, as horrendous as that would be, it could be a catalyst for an even worse catastrophe." Conflict could arise as United States and Russian troops meet in the terrorist country to secure any remaining weapons, he explained.

According to Hellman, solving the conflict with Russia is the first key step to addressing issues with Iran or North Korea.

"Let's work on the United States and Russia first because that's where the most weapons are, it's the easiest one to solve, and it will make a more fertile ground for solving later crises," he said. "If we behave more rationally toward Russia, it might help Iran and North Korea see us as more trustworthy."

## Is disarmament the answer?

Moving toward a solution starts with taking small steps, such as recognizing the problem and analyzing the risk, Hellman explained.

“When people think about nuclear disarmament - if they do - they tend to think nothing will change except that we get rid of nuclear weapons. That’s not going to happen. Before we can even determine if nuclear disarmament is possible, we need to get beyond the simple good-guy/bad-guy view of the world and recognize that things are much more complex.”

While many might brand him as foolish for tackling such a seemingly insoluble problem, Hellman takes that as an unintended compliment, noting that his award-winning work in cryptography was seen in a similar light - until it paid off.

He looks to events in the past that give humanity hope for the future. If America had rejected seemingly impossible tasks, we’d still have slavery and women wouldn’t be able to vote; history has proven that people can change, he said.

Provided by Stanford University (news : web)

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