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MILIND TAMBE

AND

THE PHANTOM ARMIES

ILLUSTRATION BY EINAR BALDVIN
STORY BY ADAM SMITH

WHEN I WAS A CHILD IN MUMBAI, MY FATHER TOOK ME TO A CONSTRUCTION SITE.
HE SHOWED ME A BRIDGE HE BUILT. I THOUGHT IT WAS EXTRAORDINARY.

I NEVER SAW A REAL COMPUTER UNTIL COLLEGE. BUT I HAD FRIENDS NAMED
RODDENBERY AND ASIMOV. THEY TOLD ME ABOUT COMPUTERS THAT COULD
PILOT STARSHIPS OR SOLVE THE WORLD'S GREATEST RIDDLES.

COMPUTER SCIENCE WAS A RIDDLE TO MY PARENTS. WHAT WAS IT EXACTLY?
YOU CAN'T SEE IT LIKE A 2,000 METER BRIDGE.

TEN YEARS AGO, I STARTED DOING VERY THEORETICAL RESEARCH.
ALGORITHMS THAT USED RANDOMNESS TO COORDINATE ROBOTS ON
THE SURFACE OF MARS.

TURNS OUT, WE DIDN'T NEED RANDOMNESS ON MARS. WE NEEDED
IT HERE ON EARTH.

MY MENTOR ONCE TOLD ME: "YOU DON'T CHOOSE THE PROBLEM; THE PROBLEM CHOOSES YOU."

NATION MOURNS

I DIDN'T KNOW IT THEN — BUT ONE DAY IN SEPTEMBER, THE PROBLEM CHOSE ME.

HOW CAN WE USE RANDOMNESS TO STOP THE TERRORISTS? I TURNED TO SOMETHING CALLED "GAME THEORY."

IMAGINE YOU HAVE EIGHT DOORS YOU NEED TO PROTECT. BUT YOU HAVE ONLY ONE COP. WHAT IF — WHAT IF YOU COULD CREATE THE ILLUSION THAT YOU ACTUALLY HAD EIGHT COPS? IT WOULD BE LIKE YOUR OWN PHANTOM ARMY.

WORKING WITH MY STUDENTS AT THE USC VITERBI SCHOOL OF ENGINEERING, WE CREATED A SOFTWARE PROGRAM CALLED ARMOR.

SINCE 2007, IT'S USED 'INTELLIGENT RANDOMNESS' TO PROTECT EVERYTHING FROM AIRPORTS, PASSENGER JETS, U.S. PORTS AND PUBLIC TRANSPORTATION.

A COUPLE MONTHS AGO, THERE WAS A RASH OF THEFTS IN A NEIGHBORHOOD. LIKE CLOCKWORK, THE THIEVES KNEW EXACTLY WHEN PEOPLE LEFT AND RETURNED HOME.
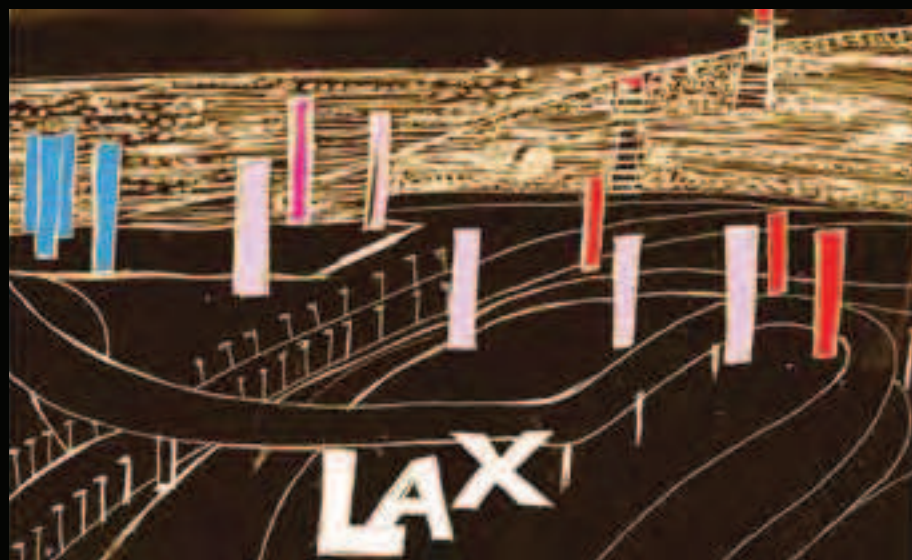

THE TERRORISTS ARE THE SAME. IN A WORLD OF SCHEDULES, OF PATTERNS, THEY LEARN TO EXPLOIT THEM. THEY LIKE PREDICTABILITY.

THERE ARE SIX INBOUND ROADS TO LAX. NOT ENOUGH POLICE TO MAN CHECKPOINTS ON ALL ROADS AT ALL TIMES. THERE ARE EIGHT TERMINALS. NOT ENOUGH K9 UNITS TO PATROL ALL OF THEM.

FOR THE BAD GUYS, WHAT THEY DON'T KNOW — WHAT GIVES THEM PAUSE — IS WHERE AND WHEN THESE LIMITED SECURITY FORCES WILL BE DEPLOYED ON THE DAY THEY ATTACK.

THAT'S WHAT ARMOR DECIDES.

THERE ARE THOUSANDS OF INTERNATIONAL FLIGHTS EVERYDAY IN THE UNITED STATES. WE DON'T HAVE AN AIR MARSHAL FOR EVERY FLIGHT. THE BAD GUYS KNOW THIS, TOO.

WE CREATED ARMOR IRIS TO KEEP THEM GUESSING.

ARMOR PROTECT IS USED BY THE COAST GUARD OF BOSTON AND NEW YORK CITY. DECIDING PATROL SCHEDULES, LOCATIONS, FREQUENCY, ETC.

SOMEONE ONCE ASKED: "WHERE DID YOU GET ALL THESE EXTRA BOATS?" I HAD TO LAUGH. THE COAST GUARD HAS THE SAME BOATS AS BEFORE.

ARMOR IS NOT LIMITED TO JUST SECURITY. IN A WORLD WHERE COMPUTER ALGORITHMS HELP FIND THE UNDERVALUED BIG LEAGUE PITCHER OR PREDICT THE WEATHER MONTHS IN ADVANCE — IT CAN BE USED FOR ANY PROBLEM WHERE YOU HAVE LIMITED RESOURCES AND CAN'T BE EVERYWHERE AT ONCE.

A PERSONAL FAVORITE: PROTECTING ENDANGERED TIGERS IN THE INDIAN SUBCONTINENT.

I NEVER BUILT A BRIDGE OR A HIGHWAY. MY WORK IS INVISIBLE. I CAN TAKE MY KIDS TO SEE A CHECKPOINT AT LAX. BUT IT'S NOT QUITE THE SAME AS THE TAJ MAHAL OR THE HOWRAH BRIDGE.

MY SUCCESS IS BASED ON A NON-EVENT. I'M OK WITH THIS.