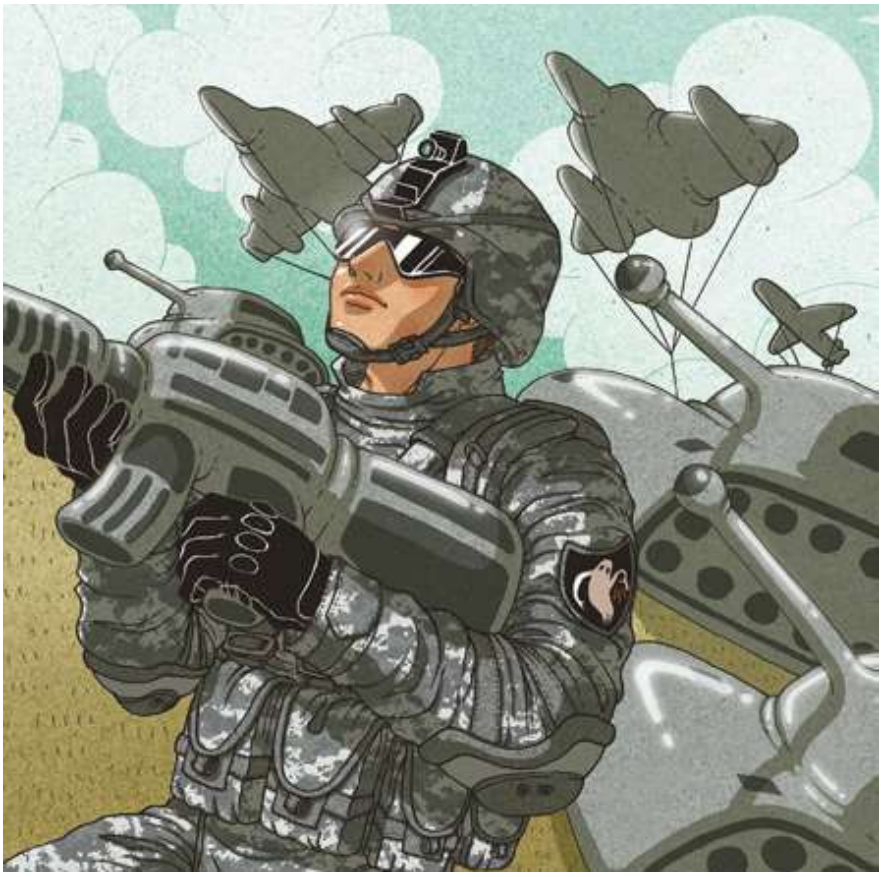
Battlefield Deceptions

To avoid or at least control conflict, militaries often play tricks on their opponents' perceptions



"*All warfare is based on deception.*"
—Sun Tzu, circa sixth century B.C.

Los Angeles is an illusory place. From the magic of Hollywood to the city's surreal atmospheric light, it's easy to feel like physical reality only sometimes coincides with your perceptions. For that reason, L.A. was the perfect backdrop for a special workshop we attended a few years ago, organized by the Defense Advanced Research Projects Agency (DARPA) to develop illusions that might help the military—itself a surreal topic. In fact, the location was necessary. Among the attendees, only three people, including both of us, were neuroscientists; the rest were high priests and priestesses from the entertainment industry—directors, writers, Foley artists (who reproduce everyday sounds for films), and sound/special-effects engineers. Together we advised DARPA on the technology and research it should invest in to ensure that the U.S. military continues to meet 21st-century scientific standards for tactical camouflage, concealment (or hiding without camouflage), and deception. Perhaps most important, the group explored the role that misperception can play as a deterrent, helping soldiers avoid battle altogether.

Governments are no strangers to military deception—on the contrary. "Misleading one's adversary about the nature, size and location of your military forces—and disguising your tactical or operational intentions—has been part and parcel of military strategy since its inception," said William Casebeer, our DARPA host, who is now research area manager for human systems and autonomy at Lockheed Martin's Advanced Technology Laboratories. Thousands of years ago legendary Chinese general Sun Tzu emphasized the importance of shaping enemy perception to optimize success, either by winning or, even better, by obviating warfare—a point echoed by virtually every prominent military theorist since. Casebeer asserted that illusions—from those affecting basic sensory input to ones shaping high-order cognition and driving judgment and decision making—have helped many nations sidestep the formation of war zones. When conflict was inevitable, illusions also helped soldiers egress from war zones safely.

We cannot discuss the specific secret ideas and approaches developed in the workshop to achieve DARPA's goals—if we told you, we *might* have to kill you!—but this article describes some publicly disclosed illusions that governments and militaries have used to create strategic surprise and save lives in the course of conflict.

BY STEPHEN L. MACKNIK AND SUSANA MARTINEZ-CONDE

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Send suggestions for column topics to **MindEditors@sciam.com**

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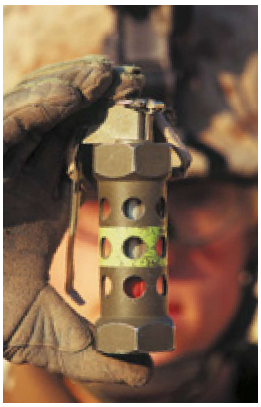
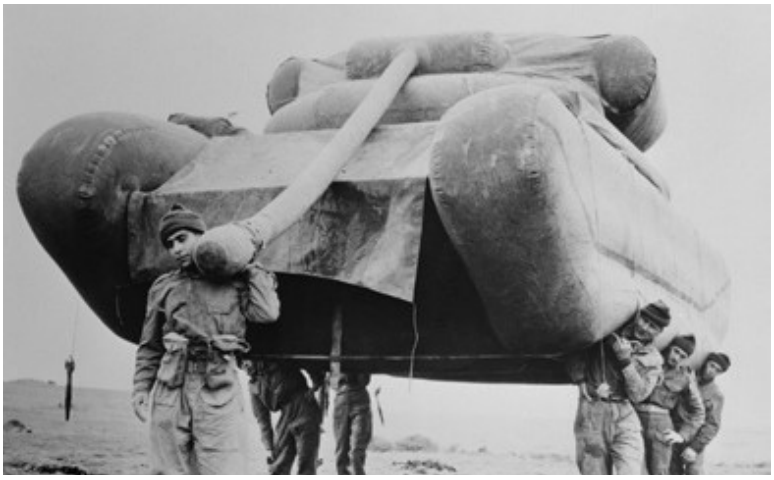
FLASH BANG



Flashing bright lights have been used to dazzle adversaries throughout the past century. In World War II, the British mounted carbon-arc searchlights on tanks as a means of blinding Nazi pilots attacking ships on the Suez Canal. The system, called the Canal Defense Light, shot a flickering bright light—which the developers thought was especially disorienting—through a turret slit, aimed at attacking aircraft. It owed its blinding effect to rapid-fire bursts of activity from neurons within the retina and the first several stages of the brain's visual system that respond to lights switching on or off (as we have shown in our own research). Although the tanks were deployed to the canal to deter bombing runs, they were not used.

A related nonlethal tool that militaries and police have used since the mid-1970s is the stun grenade. It produces a very loud explosive sound (greater than 170 decibels, or louder than a shotgun blast) and a coincident bright flash, meant to saturate all the human photoreceptors in the immediate area and temporarily blind the people they belong to. These devices are not meant to physically damage adversaries but instead to reduce the efficiency of their primary sensory systems for about five seconds.

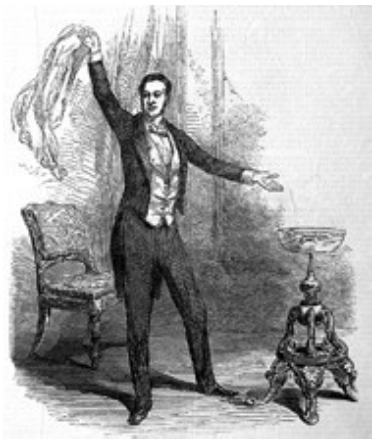


GHOST ARMIES

During World War II, the Allies built a massive army of dummies and inflatable vehicles, used to "strengthen" actual troops on the ground. These fakes were, from the air, similar enough to the real thing to affect Nazi strategy decisions in several different theaters and at various stages of the war. The British army employed a magician, Jasper Maskelyne, to lead their deception development team, called the Magic Gang. They reportedly spoofed German field marshal Erwin Rommel at the Battle of El Alamein by disguising 1,000 tanks in the north as common trucks while "attacking" from the south with 2,000 decoy tanks (plus phony support vehicles).

Today military vehicle and weapons decoys are highly realistic and can go unrecognized to within a few hundred yards. They can be deployed and removed within minutes. This type of mimicry works because the human visual system has limited acuity and thus resolves details of shape as a function of distance (the closer you are, the more detail you see). Decoys are designed with specific minimal viewing distances (and satellite-imaging resolutions) in mind so that analysts cannot easily distinguish the decoy from the real thing. Decoys are much cheaper to make than real weapons. Their strategic use can therefore boost a military's apparent capabilities at a lower cost.

MAGICAL MIGHT



In colonial Algeria in 1856, the imperial French government worried that popular tribal religious overlords, called Marabouts, had undue influence over the populace and the Arab chieftains, who widely believed that the Marabouts could produce miracles. These feats were magic tricks, of course. So French military leaders enlisted the help of famed Parisian magician Jean Eugène Robert-Houdin. They hoped that his illusions—which he performed in a theater in Algiers and later at a series of desert outposts—would rival those of the Marabouts and undermine the public's magical thinking. His so-called Light and Heavy Chest trick proved especially effective in this regard: He would call to the stage a strong man from among the Arab chieftains and ask him to lift a small wood box. Then he would announce that he would render the strong man weak—so weak that he would no longer be able to lift the same box. In fact, the box contained an electromagnet—a force unknown to the Marabouts—that Robert-Houdin used to hold it in place. For good measure, Robert-Houdin would end the act by delivering a painful but harmless electric shock to his unsuspecting Hercules, who inevitably ran from the stage.

MORE TO EXPLORE

- **Memoirs of Robert-Houdin, Ambassador, Author, and Conjurer.** Jean-Eugène Robert Houdin. Translated by Sir Frederic Charles Lascelles Wraxall. Chapman and Hall, 1859.
- **Secret Strobelight Weapons of World War II.** David Hambling in *Wired.* Published online May 17, 2008. **www.wired.com/2008/05/wwii-strobe-t-1**
- **The Ghost Army of World War II: How One Top-Secret Unit Deceived the Enemy with Inflatable Tanks, Sound Effects, and Other Audacious Fakery.** Rick Beyer and Elizabeth Sayle. Princeton Architectural Press, 2015.
- **Decoys in Service of an Inflated Russian Might.** Andrew E. Kramer in *New York Times;* October 12, 2016.

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