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By Steve Midway

11 science lessons -- from war

Former Secretary of Defense Robert McNamara's 11 lessons of war apply to scientific research, according to a biologist

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Former Secretary of Defense Robert McNamara is usually remembered for his close ties to the war in Vietnam -- his central role in the war's escalation and the associated loss of life. But McNamara, trained in economics, also spent significant portions of his life thinking about and implementing methods to improve efficiency. During World War II, for example, he worked for the Office of Statistical Control to improve flight paths and help end the war in the Pacific.

In 1995, McNamara wrote a book highlighting his 11 lessons of war, which were later featured in an Errol Morris documentary. The lessons have an ostensibly militaristic feel, but I've found that with slight tweaking they work well as guidelines for conducting scientific research.

Secretary of Defense Robert McNamara pointing to a map of Vietnam at a press conference on April 26, 1965
Image: Wikimedia commons, Marion S. Trikosko

1. Empathize with your enemy
Substitute subject or study for enemy, and the point is the same: Take time to think about what you are engaging with. What you study is more than a set of parameters; there is always more to the equation. In the same way that McNamara didn't see Vietnam for the centuries-old conflict it was, a narrow viewpoint can restrict the questions you ask and ultimately the answer you arrive at.

2. Rationality will not save us
Of course we need to approach research in a rational way, but rationality may not have the final say. Some of the least rational hypotheses are often later found to be true -- who would have hypothesized that a Penicillium fungus would produce one of the most culturally important antibiotics?

3. There's something beyond one's self
Social values and constructs help define conflict and science. In both, decisions are best approached when you remove yourself as either the advocate or omniscient. As Clever Hans, the horse mistakenly purported to do arithmetic and other mental tasks, showed us, even when we aren't consciously influencing an experiment, there can still be effects. Many scientists eliminate this error through blind or double-blind experiments, in which neither they nor their subjects know what to anticipate.

4. Maximize efficiency
This is good advice for all walks of life -- including science. To remain

competitive, scientists must regularly publish their work in peer-reviewed journals -- the traditional "publish or perish" mentality. During a study it is critical to make sure that all steps contribute to the larger research question -- not only to advance the science, but to avoid wasting resources.

5. Proportionality should be a guideline in war
As it should in science. Proportionality guides the entire scientific process: Hypotheses should be proportional based on their evidence, and the subsequent experiments must remain proportional to the initial questions. To avoid lethal outcomes, for example, FDA studies that develop recommended drug dosages must be "proportional" to relevant populations by including individuals to which the results apply.

6. Get the data
This goes without saying. McNamara was the first non-Ford Family member to be president of Ford Motors largely because he made executive decisions based on collection of good data. And in research, our conclusions and subsequent actions need to be based on facts from data, not assumptions or advocacy.

7. Belief and seeing are both often wrong
Observation is not proof -- it is evidence for something that needs further validation. Unconfirmed and ultimately incorrect observations in the Gulf of Tonkin, for example, opened the door for a war in Vietnam. Casual observation in science can likewise lead a researcher down the wrong path and to a false conclusion. Anecdotes can often help guide the scientific process, but they are not always correct, and can be a slippery slope when applying such unquantified thoughts to a study.

8. Be prepared to reexamine your reasoning
In science, ideas and evidence build on each other. Neither, however, is impermeable to fallacy or change. It's acceptable to make mistakes, but unacceptable to be blind to the possibility that you are wrong. If you still aren't sold on re-examination, perhaps you are still living on a flat earth, around which the sun and other planets are revolving.

9. In order to do good, you may have to engage in evil
Ideally this lesson has less truth in science than in war; however, sacrifice of life can be an acceptable protocol if administered appropriately and executed for the right reasons. While pain, suffering, and death are not to be taken lightly, animal studies can be acceptable if the benefit of the end product outweighs the negative aspects of the process.

10. Never say never
A never-say-never attitude is often what keeps science going. Whether you're searching for a cure for cancer or cold fusion the idea of mentally restricting yourself eliminates possibilities that may provide solutions. Recall that Krebs and his eponymous cycle were originally rejected from the journal *Nature* -- good thing Krebs persisted.

11. You can't change human nature
Both science and war can be infinitely complex and often beyond human comprehension. Neither has preordained answers, despite our tendency towards supposition. So long as a human has hypothesized, designed, executed, or in any other way influenced a study, human nature has, too. Think about your study from various vantage points, and avoid jumping in headfirst in pursuit of a self-fulfilling prophecy.

Steve Midway is a PhD student at the University of North Carolina Wilmington, studying fisheries biology.

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