The Caveman and the Bomb in the Digital Age

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 "The unleashed power of the atom has changed everything save our modes of thinking, and we thus drift toward unparalleled catastrophe."

–Albert Einstein

"I am deeply moved if I see one man suffering and would risk my life for him. Then I talk impersonally about the possible pulverization of our big cities, with a hundred million dead. I am unable to multiply one man's suffering by a hundred million."

–Albert Szent-Györgyi

"No human decision is more fraught than one involving the use of nuclear weapons—a decision on which may ride the lives of millions of people and potentially the fate of civilization."[1] Albert Einstein and his colleagues recognized this fundamental truth in 1946 when they formed the Emergency Committee of Atomic Scientists to "promote new types of essential thinking . . . to harness the atom for the benefit of mankind and not for humanity's destruction" (New York Times, 1946).

Nevertheless, in the following years, hydrogen bombs—with vastly more destructive power than the bombs dropped on Hiroshima and Nagasaki—emerged from the efforts of the scientific community as the focus of national security turned towards the Soviet Union and the Cold War got underway in earnest. Some 70 years after Einstein's words, there is little evidence that we have changed our modes of thinking, but psychological studies of risk perception and decision making have taught us that he was correct. Although our minds are capable of rational deliberation, our thinking is dominated by the fast, intuitive reactions that helped us survive in the cave and remain useful in the modern world except when the stakes are high (Kahneman, 2011).

Decisions about the use of nuclear weapons have the highest stakes possible, and fast, intuitive reactions may be the worst way to make such decisions. Yet today, the advent of social media increases the likelihood of such reactions. A social media environment that increases the velocity and reach of information, creates potent vectors for disinformation, eliminates journalistic fact-checking, and changes how political leaders interact with other leaders and constituencies poses

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[1] This quote is taken from the Stanley Foundation policy brief "Three Tweets to Midnight," which summarized the proceedings of the conference that led to this paper.

enormous challenges for responsible decision-making during crises between nuclear-armed states.

Applying what we now know about the limitations of the human mind can help to reduce the risks from nuclear weapons that we have accepted for decades. This paper aims to honor Einstein's insight by documenting what we have learned about human thinking and its implications for decisions regarding the use of nuclear weapons.

From the inception of the atomic age, decisions regarding nuclear weapons were recognized as extraordinarily challenging (Rhodes, 1996, 2012). Some of the designers and builders of the first A-bombs thought that the weapons program was unconscionably immoral and should be stopped. In the midst of WWII and facing the prospect of Hitler with an atomic bomb (a plausible threat given German intellectual pre-eminence in physics at the time), they relented and continued their work, even after the tide of the war had turned decisively against Hitler's armies. A number of them argued that the bomb did not need to be used against Japan, at least not without first demonstrating its power to the Japanese, but they were overruled as they lost the debate over the necessity and morality of dropping the bomb (Rhodes, 2012).

The postwar trajectory of the nuclear weapons story and the arms race is well known, starting with a few fission bombs and progressing by 1986 to more than 60,000 in the stockpiles of the U.S. and Soviet Union (later Russia) alone, some of these almost a thousand times more powerful than the original Hiroshima device (Kristensen & Norris, 2015). Nine nations currently possess these weapons.

Some Psychological Considerations

Shortly after the dawn of the nuclear era, psychologists and other behavioral scientists began the empirical study of the cognitive and social factors influencing human decision making in the face of risk. The findings are worrisome, identifying numerous cognitive limitations documenting a form of bounded rationality that falls far short of the optimistic assumptions that characterized earlier theorizing by economists and other proponents of rational choice explanations for human behavior. Here we shall briefly describe a few selected findings that challenge the ability of our leaders to make rational decisions about using nuclear weapons. In addition, we shall also discuss ways that today's social media likely exacerbate these already daunting challenges.

Thinking: Fast and Slow

Much recent study regarding the psychology of decision making acknowledges a distinction between two modes of thinking: fast and slow (Kahneman, 2011).

Fast thinking relies on intuition, quick impressions, reflexive judgments, and gut feelings. Slow thinking relies on careful analysis and deliberation, often with numbers and calculations. We rely on fast thinking most of the time as our default mode of thought because it is easier, feels right, and works pretty well to guide us in our daily lives. In this sense, it is often helpful to rely on gut feelings, honed by direct experience, as this behavior has proven effective enough to enable our species to survive a long and dangerous journey from the cave to the modern world.

Slow thinking is more recent in origin. Our brains evolved the capacity to think symbolically and apply logic and reason to guide our decision-making. Slow thinking enables us to imagine and critically evaluate consequences beyond those right in front of our eyes. Indeed, it has accomplished technological and other miracles. When the potential consequences of our decisions are extreme and outside the realm of our direct experience, it is important for decision makers to recognize the need to think more carefully and make the effort to do so.

Both of these valuable modes of thought, fast and slow, have serious downsides. Fast thinking is problematic when we're trying to understand how to respond to large-scale human crises, with catastrophic consequences. Our fast intuitive feelings don't obey the rules of arithmetic or logic. They don't add properly and they don't multiply, as the introductory quotation by Nobel Laureate Albert Szent-Györgyi recognizes. This leads to an absence of feeling that has been characterized as "the more who die, the less we care" (Slovic & Västfjäll, 2015). Slow thinking, too, can be incoherent in the sense that subtle influences—such as unstated, unconscious, or implicitly held attitudes—may lead to considered decisions that violate one's strongly held values. The failings of both fast and slow thinking pose problems for decisions about nuclear weapons.

Psychic Numbing and the Fading of Compassion

Military planners and decision makers (which for this paper includes the civilian leadership of the military) presumably accept the proposition that during conflict, the taking of noncombatant deaths should be avoided. Not at all costs, however. The laws of war (law of armed conflict, international humanitarian law) are based on ethical principles stating that (1) under some circumstances, it is morally justifiable to engage in armed conflict and (2) that once engaged in armed conflict, care must be taken to avoid excessive collateral damage in any attack, defined as a degree of death and destruction of noncombatants and non-military property that would be excessive in relation to the direct military advantage anticipated in that attack. Adherence to these principles (and international law) requires that planners place a value on inadvertent damage that a military operation may cause so that such damage can be weighed against the value of the military objectives.

Toward that end, think for a moment about two questions. First, how might we value the protection of human lives? And second, how do we value the protection of human lives?

Here are two answers to the first question, based on slow thinking combined with a value set that posits the importance of all non-combatant human lives regardless of nationality or ideological affiliation.
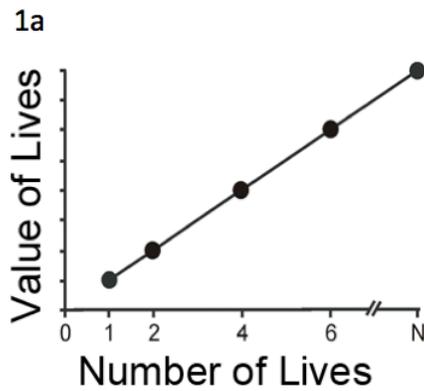
1a — Every human life has equal value
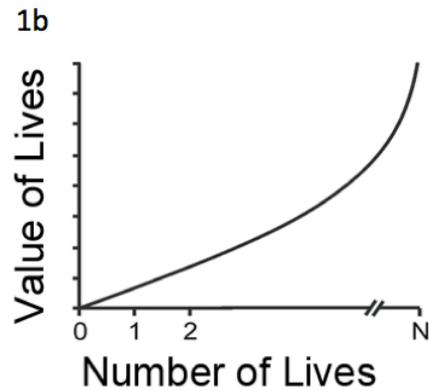
1b — Large losses threaten the survival of the group or society

Figure 1. Two normative models for valuing non-combatant lives as the number at risk increases. Adapted from Slovic (2007, pp. 83–84).

If we believe that every non-combatant life has equal value, then the value of protecting those lives should increase in a straight line as the number of lives at risk increases, as shown in Figure 1a. This is a simple process of addition.

When additional losses of life threaten the extinction of a people, as in the case of genocide, the very next life at risk is even more valuable to protect than the life before it, causing the value line to curve upward as in Figure 1b.

Figure 2 illustrates what research tells us about how most people (including entirely well-meaning military planners and decision makers) actually tend to feel about the value of protecting non-combatant lives as the number of lives at risk increases. The outcomes depicted in Figure 2 are driven by the fact that intuitive judgments and feelings—based on fast thinking—often override our more thoughtful judgments.
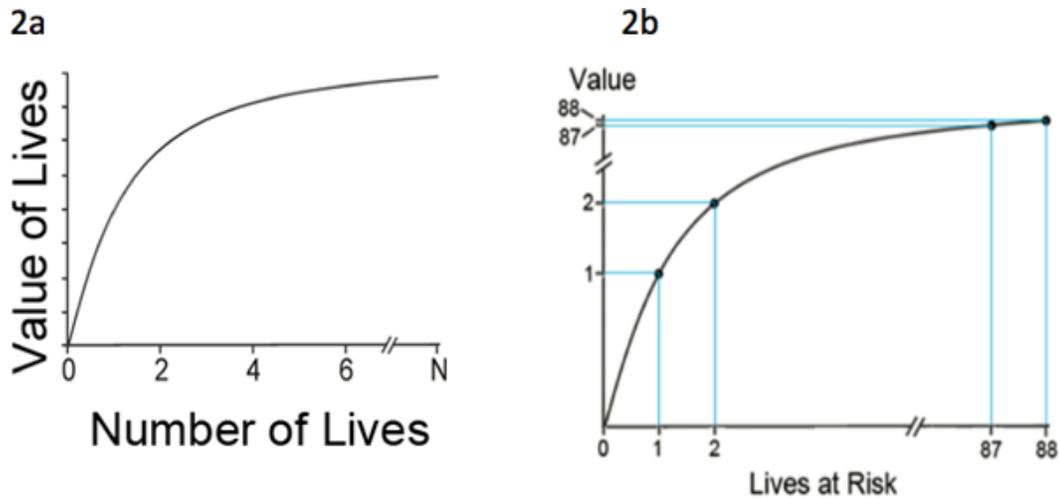
Figure 2. Psychic Numbing. A descriptive model where the value of a life depends on how many lives are at risk. Adapted from Slovic (2007, p. 85).

Figures 2a and 2b show that the biggest change in value occurs with the first life, going from zero to one. On an emotional level, we care greatly about protecting single lives, something known to researchers as "the singularity effect" (Wiss, Andersson, Slovic, Västfjäll, & Tinghög, 2015). But as the numbers increase, "psychic numbing" begins to desensitize us.

Figure 2b is an elaboration of Figure 2a. It shows that two lives don't feel twice as valuable to protect as one. In fact, as the number of lives at risk increases, the additional lives seem to add less and less value and the curve flattens. This means you probably won't feel much different about a threat to 88 lives than you feel about a threat to 87 lives. This curve also shows that a life that is so valuable to protect if it is the first or only life at risk seems to lose its value against the backdrop of a larger tragedy, with many lives endangered.

But it gets even worse than this.

Figure 3 is supported by research and observations indicating that, as the number of lives in danger increases, we sometimes lose feeling and value the sum total of those lives even less (Västfjäll, Slovic, Mayorga, & Peters, 2014).
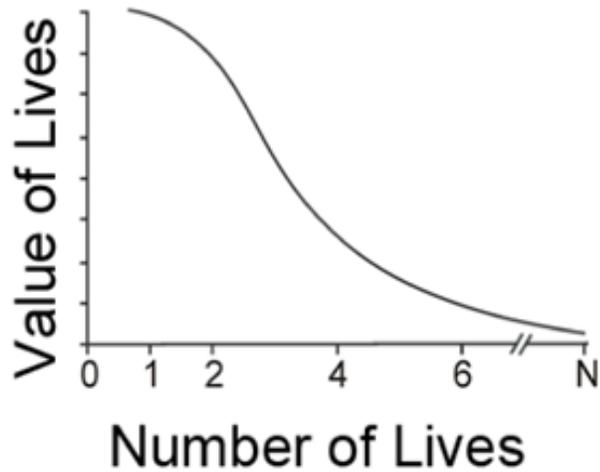
Compassion Collapse

Figure 3. Compassion Collapse: Value sometimes decreases when many lives are at risk. Adapted from Slovic (2007, p. 90).

Psychic numbing and compassion collapse may have important effects on how planners and decision makers consider nuclear conflict. Ethical planners and decision makers are expected to weigh the value of accomplishing their military objectives relative to the value of the likely collateral damage. Evaluating the prospect of millions of expected noncombatant deaths in accordance with Figure 1 would make it difficult to proceed with that option as compared to evaluating it in accordance with Figures 2 or 3. In other words, psychic numbing and compassion fade, as depicted in Figures 2 and 3, reduce the perceived value of large numbers of lives relative to the additive models of Figure 1—and such a reduction, if large enough, enables the planner and decision maker to proceed to kill millions in a manner they believe to be consistent with the laws of war.

Numbing in War

Unfortunately, psychic numbing and compassion deficits and their grim implications are not mere figments of laboratory experiments. They appear to occur frequently in the annals of warfare. In World War II, even prior to nuclear weapons, commanders did not refrain from using conventional firebombs to attack cities and civilians (e.g., in Dresden and Tokyo) with dead human beings becoming mere statistics, "human beings with the tears dried off," as someone once said.

Tokyo was one of more than 60 Japanese cities partially or totally destroyed by firebombing, which was orchestrated by General Curtis LeMay (Rhodes, 1996). Hundreds of thousands of Japanese civilians died in those attacks. LeMay was congratulated by General Hap Arnold after his "success" with Tokyo. Questioned after the war about the morality of the bombings, LeMay replied: "Killing Japanese didn't bother me . . . It was getting the war over that bothered me. So, I wasn't particularly worried about how many people we killed" (Rhodes, 1996).

In 1954, LeMay, by then commander of the U.S. Strategic Air Command, which operated U.S. strategic forces, entertained a preemptive nuclear attack on the Soviet Union to prevent them from challenging American military and political superiority. It was estimated that the 750 atomic bombs he envisioned using would leave 60 million dead. By 1962, his associate, General Thomas Power, was prepared to deliver almost 3,000 nuclear bombs, many of them thermonuclear, killing at least 100 million people in order to decapitate Soviet leaders (Rhodes, 1996). LeMay was similarly aggressive in urging President Kennedy to bomb Cuba and take out the Soviet missile sites there, a move that would have put the world on the brink of nuclear war.

Ellsberg (2017) reports other sobering examples of numbness to consequences from the same era. Technological advances allowed substitution of H-bombs for A-bombs in planning for a possible war against the Soviet bloc, thus raising the expected death toll from executing the U.S. nuclear war plan from about 15 million in 1955 to more than 200 million in 1961. He writes: "There was no new judgment of the necessity for the dramatic change in the planned-for effects of our attack. The war planners were simply assuming, correctly, that SAC meant to replace their atomic weapons of the first decade of the nuclear era with the newly available H-bombs, thermonuclear warheads, against essentially the same ever-expanding target system" (p. 270). Ellsberg notes that "the risk the presidents and Joint Chiefs were consciously accepting, however small they saw the probability of carrying out the [U.S. nuclear war plan], involved the possible ending of organized society—the very existence of cities—in the northern hemisphere, along with the deaths of nearly all its human inhabitants" (p. 272).

Reporting on a briefing on the U.S. nuclear war plan given to President Kennedy in September 1961, Sagan (1987, p. 51) notes a key passage in the briefing's text: "while personnel casualties would be somewhat reduced if urban-industrial installations were not directly attacked, nevertheless, because of fallout from attack of military targets and co-location of many military targets with urban-industrial targets, the casualties would be many millions in number. Thus, limiting attacks to military targets has little practical meaning as a humanitarian measure."

In 2017, President Trump, speaking before the UN, threatened to "totally destroy North Korea" if that "depraved" regime did not halt its provocative missile testing (White House, 2017). The President gave no indication that he had seriously attempted to appreciate the consequences of killing 25 million people. Moreover, his bellicose threat dramatically calls attention to the possibility that we have created weapons whose vast destructive power may be beyond our comprehension.

The American public appears similarly numb to the consequences of nuclear conflict. A recent survey suggests that the American public, like their leaders, are willing to abandon the principle of noncombatant immunity under the pressures of war (Sagan & Valentino, 2017). When considering the use of nuclear weapons in a hypothetical scenario about war with Iran, almost 60% Americans prioritized protecting U.S. troops and achieving American war aims, even when doing so would result in the deliberate killing of millions of foreign noncombatants. These findings suggest that public opinion is unlikely to be a serious constraint on any president contemplating the use of nuclear weapons in wartime.

The incongruity between the singular importance of protecting individual lives and the acceptability of mass killing is brought home in the proposal by Roger Fisher (1981) that the

secret code the President needs to initiate a nuclear attack be implanted near the heart of a person whose life the President would have to take to begin the process of killing millions. Reactions to this proposal have included "My god, that would be the taking of an innocent life!," "If the President had to do that, he might never respond," and "That would distort the President's judgment!"

Tribalism and Dehumanization

Much of mass killing in warfare is accompanied not by the absence of feeling but rather by intense emotions such as anger and hatred. Such emotions thrive in an "us vs. them" environment, a phenomenon often referred to as tribalism. Because the U.S. government viewed Japan as a threat, all Japanese people were considered to be a threat, even those who were U.S. citizens and thus were forcibly relocated to isolated camps. The American government created propaganda featuring crude images of Hirohito and Axis leaders as animals and murderers (Dower, 1986). Dehumanizing images and phrases may explain why, in August 1945, 85% of U.S. citizens approved of the bombings of Hiroshima and Nagasaki (Moore, 2005). One poster showed Uncle Sam holding a caricatured Japanese male in one hand, by the nape of his coat, and a giant mosquito tagged with the name malaria in the other hand. The caption read: "ENEMIES BOTH. IT'S YOUR JOB TO HELP ELIMINATE THEM."

It is well known that making the enemy distinctively different and then dehumanizing them is a critical factor in turning normal people into mass murderers (Waller, 2007; Zimbardo, 2007). Jews were first distinguished as "the other" by being forced to wear yellow stars on their clothing. Later they were stripped of their names by Nazi captors, who tattooed numbers on their forearms. They were called vermin and rats, thus in need of extermination. Similarly, Tutsis in Rwanda were called cockroaches during their massacres.

In practice, it is often that little distinction is made between an enemy's military forces and the civilian compatriots of enemy. It is true that compliance with the laws of war obligate military forces to refrain from explicitly targeting noncombatants, but acknowledging the inevitability of noncombatant casualties, the laws of war forbid only attacks that cause such casualties that are "excessive" compared to the military advantages gained by the attack. The word "excessive" does not have a precise definition and is inherently subjective, i.e., dependent on human judgments.

But if it is human judgment that determines the meaning of "excessive" in any given instance, it is inevitable that all of the psychological considerations described above will be a part of such determinations—and in particular, fast, intuitive, reflexive thinking will tend to drive those determinations unless mechanisms are put into place to allow for more reflective deliberation. Additionally, the subjective nature of such determinations facilitates post-hoc rationalization—a reflexive judgment can be followed by a justification that had nothing to do with the original judgment.

The historical record is clear that senior U.S. officials knew that firebombing Tokyo or using the atomic bomb against Hiroshima and Nagasaki would cause massive civilian casualties (Rhodes, 1992, 1996; Searle, 2002). But what were the mental processes that underlay their decisions to proceed? The most frequently offered rationale was that these actions were necessary to win the war against Japan—and Japanese civilians and civilian infrastructure were part of the Japanese war effort. For example, Lemay (1965) wrote that in bombing Japan:

> We were going after military targets. No point in slaughtering civilians for the mere sake of slaughter. Of course there is a pretty thin veneer in Japan, but the veneer was there. It was their system of dispersal of industry. All you had to do was visit one of those targets after we'd roasted it, and see the ruins of a multitude of houses, with a drill press sticking up through the wreckage of every home. The entire population got into the act and worked to make those airplanes or munitions of war . . . men, women, children. We knew we were going to kill a lot of women and kids when we burned [a] town. Had to be done.

At the same time, there is considerable evidence that senior military leaders in the United States saw the Japanese as sub-human. For example, Admiral William Halsey called Japanese pilots in the Pacific "little yellow monkeys" (Life, 1944, p. 30). Such evidence suggests the decisions to attack Japanese civilians were at least in part motivated (or enabled) by dehumanization of the Japanese enemy. To the extent that this is true, the natural human abhorrence to killing other humans no longer inhibits such action, as attacks on nasty animals or insects do not implicate this abhorrence.

Tribalism and dehumanization also enable people to believe that victims deserve their fate (Waller, 2007, pp. 212–219). Effects of this belief can be compounded by the just world hypothesis (Lerner, 1980), which states that people need to believe that the world is just, and therefore people get what they deserve. For example, Rosenthal's (1998) interviews with three generations of non-Jewish Germans reveal the ways in which perpetrators blamed Jews for their own destruction during the Holocaust. Blaming the victims allows the perpetrator to act without guilt against victims seen as less than human, to believe that the victims are evil, and the killing

that leaders have told him to do is morally *proper* (Grossman, 1995). Tribalism, dehumanization, and victim blaming enable mass murder to proceed without challenge from normal feelings, i.e., feelings that would arise from human beings recognized as being similar to one's self.

Avoiding Tradeoffs and Devaluing Foreign Lives

Experimental and historical evidence demonstrates that decision makers find tradeoffs between competing values difficult to make and thus tend to avoid them (Payne, Bettman, & Schkade, 1999; Tetlock & McGuire, 1986). What common units can be used to compare the value of protecting national security vs. protecting non-combatant enemy civilians? How can one justify sacrificing or compromising one basic value for another? Numerous studies have demonstrated that the heuristics used to resolve tradeoff conflicts are often noncompensatory. That is, rather than finding a common currency with which to evaluate tradeoffs, a decision maker will prioritize his or her different goals and focus on achieving those of highest priority. As Hammond and Mumpower (1979) observed, "When our values conflict, we retreat to singular emphasis on our favorite value" (see also Jervis, 1976). This simplistic strategy has more recently been described as a "prominence effect" that leads decisions to favor security objectives over lifesaving objectives because the former are more defensible (Slovic, 2015).

Maslow (1943) proposed a hierarchy of needs, a prime characteristic of which is that a person will seek to satisfy a given need (e.g., food) only after he or she has satisfied higher priority needs (e.g., air). Slovic (2015) invoked Maslow's hierarchy of needs to argue that leaders will attend to fundamental needs for safety and security before they will respond to lower priority needs such as the moral obligation to protect others. Slovic proposed the prominence of political and national security objectives, obviously highly defensible, over humanitarian lifesaving (less defensible) as an explanation for the reluctance of the U.S. government to intervene to prevent genocides and mass atrocities. For example, early in the Syrian war, while acknowledging "very real and legitimate" humanitarian interests in Syria—some 80,000 people had already been killed, and millions had lost their homes—President Obama said his "bottom line" has to be "what's in the best interest of America's security" (White House, 2013).

The prominence effect can be thought of as an attentional spotlight on the most inherently defensible attributes of a decision, driving those attributes to assume greater, and sometimes extreme, priority and importance in a decision maker's thinking. For decisions pertaining to the development and use of nuclear weapons (and indeed to most decisions involving the use of military force), the historical record described earlier suggests that the spotlight will be on the perceived contributions to national security interests, as in the decision to bomb Hiroshima and Nagasaki to protect our military personnel in the waning days of World War II, despite the likely loss of many Japanese lives. The same security prominence can be seen in the desire of Curtis LeMay to launch preemptive nuclear strikes against the Soviet Union (Rhodes, 1996, 2012).

The devaluation of lives may also be inadvertent. The prominence effect suggests that high priority objectives, in particular those seen as offering enhanced security, will draw attention away from less prominent and lower priority goals. All eyes are on options that protect the homeland, and decision makers fixated on security are likely to be inattentive to other important factors, such as the number of noncombatants that will die. Under such circumstances, many noncombatant lives may be placed at risk. But this devaluation of human lives may not be

deliberate—this would be abhorrent to leaders with conscience who truly do value those lives. Rather, with the attentional spotlight on security objectives, leaders will have only peripheral awareness at best—and no awareness at worst—of other considerations. It is not that the objective such as minimizing the number of deaths is seriously considered in light of the security benefits and rejected, it is that little or no conscious thought is expended at all in such consideration.

Similarly, psychic numbing, compassion fade, tribalism, and dehumanization are psychological processes that often operate without conscious awareness, especially under the pressure of stressful circumstances (an example of which is clearly the contemplation of a real nuclear war). These processes create a deficient understanding of death and damage projections that does more than confound rational balancing of costs and benefits—they may encourage shallow assessments that give short shrift to consequences altogether.

For example, they may contribute to what Michael Mazarr has named "imperative driven decision making" (Mazarr, 2016). Imperatives are forceful calls to action that feel so obviously correct that deeper analysis seems unnecessary, e.g., "we have to stop the spread of communism in Southeast Asia," prior to escalating U.S. commitments in Vietnam, or "we can't allow these beautiful little babies to be murdered by chemical weapons," prior to sending a volley of missiles at a Syrian air base.

Mazarr asserts that "decision makers under the influence of an imperative are scratching an immediate itch, not thinking about the possible outcomes of their actions" (2016, p. 81). He describes this shallow thinking as arising from pressures and constraints that leave decision makers with inadequate time for deliberate thinking and "classic outcome-oriented utility calculations" (p. 83). He argues that:

- imperative-driven thinking is likely to obstruct careful analysis of utilities or objectives;

- imperatives are likely to generate subjective and shifting utilities rather than constant and objective ones;

- decision makers responding to imperatives will not engage in a legitimate comparison of alternatives;

- decision makers under the influence of an imperative will be blinded to many potential consequences and risks outside the scope of the imperative; and

- discussion of potential risks and second-order effects is likely to be downplayed and even actively discouraged.

Thus, an imperative such as "We must keep Muslim terrorists out of our country" that few would disagree with may lead to a blanket ban on travel and immigration that is not justified by evidence and fails to consider the harm done to thousands of innocent people (Van Boven & Slovic, 2018) or to the economy.

Social Media

Social media are ubiquitous in U.S. society. A recent survey indicates that 80% of all social media usage occurs on mobile devices.[2] A large fraction of U.S. military personnel routinely carry mobile devices, and thus access to social media by such personnel should be assumed to be the default condition.

This point is particularly significant in light of the admonition of Russell Dougherty (2011), former commander-in-chief of the Strategic Air Command:

> [T]he nation has never experienced anything comparable to an agonizing debate regarding the use of nuclear options. Should this be the background of any such execution decision, *national cohesion may depend critically on keeping the fact of such debate from the public and from those in the nuclear commands who must respond."* (p. 420, emphasis added)

In other words, if those charged with actually executing the war plan learn about debate regarding the wisdom and desirability of using nuclear weapons, they may not carry out their responsibilities as they are expected to do, despite their involvement in the Personnel Reliability Program (Department of Defense, 1993) intended to ensure that only the most trustworthy personnel are in the nuclear chain of command. In a world of ubiquitous social media on ever-present mobile devices, it is hard to imagine keeping knowledge of such debate away from military personnel for very long.

How exposure to social media during crisis or conflict might affect the decisions of those in the nuclear command-and-control chain is unclear. Dougherty died in 2007, so it is impossible to ask him to elaborate on what he meant by "national cohesion," but in context it must refer to something like national will or unity; conversely, a disruption of national unity might well mean discordance and a cacophony of different views that would increase the likelihood that some of those in the nuclear command and control chain would not carry out their missions. Hoping for such an outcome would increase the incentives of an adversary to directly inject uncertainty and doubt into the U.S. nuclear command and control system; such an outcome would tend to weaken deterrence, which depends on certainty of response.

What is known about the affordances of social media and their impact on the information ecosystem is not particularly comforting. For example, if one wanted a media technology optimized for effectively broadcasting simplistic imperatives for action, one could hardly do better than 280-character Twitter messages—and while short Twitter messages are arguably the most simplistic of the messages that appear on social media, the messages of most social media platforms are simplistic compared to those that are available from traditional media such as books or even newspapers. Social media tend to be rich in video content and imagery, rather than text. Because people are connected to social media for many hours a day, they receive social media communications frequently—and they are neurochemically rewarded for engaging with social media (Meshi, 2015). These characteristics of social media and the patterns of behavior

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[2] https://marketingland.com/facebook-usage-accounts-1-5-minutes-spent-mobile-171561

that they introduce suggest strongly that the content of social media messages is more likely to be processed with fast, intuitive thought rather than with reflective, deliberate thought.

If use of social media were limited to the populace at large, this tendency towards fast, intuitive thought would be bad enough. But senior decision makers, including certain heads of state, are known to be active social media users, and they are just as likely to be pushed by their social media usage into fast, intuitive thought. In other words, exposure to social media at higher levels of command—those with the authority to order the use of nuclear weapons—may increase the likelihood of taking rash action and of premature use. (Note as well, though it is widely believed that only the President has the authority to order the use of nuclear weapons, the president's ability to delegate his or her authority to other parties remains—and the details of who may or may not have pre-delegated authority to order the use of nuclear weapons are withheld from public knowledge as a highly protected secret.)

Where Next?: Slow Down the Decision-Making Process for Using Nuclear Weapons

The psychological and communication issues described above show the need to ensure that the vast lethal potential of nuclear weapons is not unleashed because psychic numbing, compassion fade, tribalism, and dehumanization have distorted the decision-making calculus.

The risk of distorting the decision-making calculus can be reduced in many ways. For example, decision analytic procedures, facilitated by skilled guides, can help deepen understanding of options, objectives, and the tradeoffs that need to be made consistent with the considered values associated with the objectives and the likely outcomes of the various possible actions. Knowledge of outcome probabilities and uncertainties must factor into the decision-making calculus as well.

Exercising these decision-aiding procedures is a necessity as well, and it is particularly valuable to involve principals (i.e., the people who would actually be making decisions amidst a crisis, rather than stand-ins, no matter how respectable or smart). As an example of such an exercise, consider the Proud Prophet exercise, played out over a couple of weeks in June 1983 (Bracken, 2012). This exercise included the use of actual war plans and the personal involvement of the chairman of the joint chiefs of staff and the secretary of defense. (It is noteworthy that after this exercise, which ultimately resulted in a global thermonuclear exchange, the nuclear rhetoric of the Administration in office at the time changed, becoming significantly less bellicose (Bracken, 2012).) Finally, the operational dimensions of such exercises deserve significant attention, so as to ensure that informed decisions regarding nuclear weapons will be translated into commands that will be faithfully and precisely executed (Dougherty, 2011).

But the biggest distortion of all on rational decision making is the pressure of time. Adequate time is needed for deliberation in nuclear decision making and assessment of tradeoffs and options—and it is also needed if the President and his or her advisors need to wait for more information (Authority to Order the Use of Nuclear Weapons, 2017). In turn, the time available for decision making is primarily limited by the possibility that a president might want to exercise a launch-on-warning option for U.S. land-based ICBMs. If it were known in advance that a president would never want to do so, or if the nuclear forces were configured in such a way that

launch-on-warning was not a requirement for force survivability, significant additional time would be available to engage in nuclear decision making.

Fisher's proposal to require the President to kill an innocent individual (presumably a volunteer!) before he or she could order a nuclear attack was intended to confront the President with the reality and consequences of that decision. But less extreme measures can be and have been taken under similar circumstances. For example, during the Cuban missile crisis, President Kennedy asked his brother Robert to serve as a devil's advocate to reduce the likelihood of groupthink and a falsely-arrived-at consensus. One could imagine a senior advisor to the President with the specific role (perhaps among other roles) of forcibly introducing into deliberations evidence of the likely human consequences of a decision. Another more intrusive possibility is that the nuclear chain of command be arranged so that the concurrence of two or more decision makers (e.g., the president AND the Secretary of Defense) would be required to launch nuclear weapons (Lin, 2016). Looping in a second party would be harder to do if the launch decision window was not extended, but with a reconfigured nuclear arsenal, the launch decision window could be extended significantly.

Yet decisions about nuclear weapons will always be impossibly difficult to make even by the most sober and clear thinking of leaders. The historical record shows that it is dangerously naïve to believe that national leaders will not resort to the use of nuclear weapons when security is threatened. The psychology described here documents perceptions and reasoning that increase the likelihood of future use and may be difficult to eradicate. And, to our knowledge, no president has been adequately briefed or trained to make knowledgeable tradeoffs and wise choices in this most difficult of all decisions).[3] A seasoned commander with nuclear weapons responsibilities described the struggle to prepare his mind "to be able to make the tough decisions," humbled by the recognition that "there are no 'experts' in waging nuclear conflict" (Dougherty, 2011).

This outlook is pessimistic even before taking into consideration the changing nature of today's digital media environment, which blurs the line between truth and strategic misinformation and disinformation and transmits falsehoods at unprecedented speed to a global audience. As we have seen, media such as Twitter also can be used by leaders to communicate, one on one, bypassing advisors, congressional scrutiny and diplomatic channels. The skillful and malicious destruction of truthfulness in information not only shatters the confidence in facts crucial to decision making, it weakens the bonds of trust between the president and commanders. As Dougherty (2011, pp. 412–413) points out, "There is no room for deception or make believe within the nuclear commands; their weapons are real."

Conclusion

In this paper, we have reviewed numerous psychological processes, conscious and non-conscious, active and passive, that help explain how our government and we citizens can allow nuclear war to occur. Essential to this tolerance for mass killing are cognitive and social

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[3] Indeed, it has been said (Doherty, 2011, pp. 421–422) that it would be highly undesirable to have the President participate personally in the presidential decisions made in exercises and war games because it might tend to provide the adversary with insights into what he or she might actually do in a crisis.

mechanisms such as psychic numbing, compassion collapse, tribalism, dehumanization of others, blaming of victims, attentional failures, and faulty decision-making processes, all of which work to destroy feelings and understanding that would normally stop us from planning, executing, and tolerating such inhumane acts. What reason is there to believe that we are now in a new age of enlightenment where we will no longer behave in this way? How can we prevent the lethal potential of nuclear weapons from being unleashed because these psychological processes, some of which have guided humans since we left our caves, have inhibited rational decision making?

In a Wall Street Journal op-ed written in January 2007, George P. Shultz, William J. Perry, Henry A. Kissinger, and Sam Nunn—respected public servants from both parties—endorsed the goal of a world free of nuclear weapons and working energetically on a variety of actions needed to achieve that goal. We endorse that sentiment, believing that it is too dangerous to continue on a course that presumes the rationality of national leaders under the most emotionally stressful circumstances possible, including untrustworthy social media and extreme time pressures. Absent the global elimination of nuclear weapons (unlikely for the foreseeable future), perhaps the most practical approach for now is to develop ways to improve the circumstances under which nuclear decision making takes place. The most important first step in that is to find ways to increase the time available to deliberate and to require the participation of multiple decision makers, all of whom have been carefully trained for the most difficult decision any human beings will have to make.

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