41st Annual North American Meeting of the Society for Medical Decision Making; October 21, 2019; Portland, Oregon

Keynote Address

The More Who Die, the Less We Care: Confronting the Deadly Arithmetic of Compassion*

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In this keynote address delivered at the 41st Annual North American Meeting of the Society for Medical Decision Making, I discuss the psychology behind valuing human lives. Research confirms what we experience in our daily lives. We are inconsistent and sometimes incoherent in our valuation of human life. We value individual lives greatly, but these lives lose their value when they become part of a larger crisis. As a result, we do too little to protect human lives in the face of catastrophic threats from violence, natural disasters, and other causes. In medicine, this may pose difficult choices when treating individual patients with expensive therapies that keep hope alive but are not cost-effective for the population, for example, with end of life. Lifesaving judgments and decisions are highly context-dependent, subject to many forms of response mode and framing effects and affective biases. This has implications for risk communication and the concept of shared decision making. Slower, more introspective decision making may reduce some of the biases associated with fast, intuitive decisions. But slow thinking can also introduce serious biases. Understanding the strengths and weaknesses of fast and slow thinking is a necessary first step toward valuing lives humanely and improving decisions.

Keywords
affect heuristic, psychic numbing, valuing lives

When I learned that the theme of the conference was "Many Views on Value," I thought I should probably adjust my title a little bit, because my talk is very relevant to the theme. An alternative title would be, "Many Views on Valuing Human Life." But first some ancient history and a connection to the founder of this society.

When I came to Eugene in 1964, I was given an assignment. My colleagues had just collected data where they asked radiologists to make judgments about simulated gastric ulcers. Specifically, they were asked to judge the likelihood that an ulcer was malignant. This 1968 paper resulted from that work.[1] Here is what the task looked like. Nine radiologists were shown seven signs pertaining

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*In order to encourage its wide dissemination, this article is freely accessible in *Medical Decision Making* and in *MDM Policy & Practice*.

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to each ulcer—they didn't see the actual images—and they were asked to then judge the likelihood of malignancy for each of 96 simulated ulcers. The signs were varied in a way that when we tracked each person's judgements across the 96 cases, we could determine the weight they were giving to each of these signs. We found that a very simple algebraic model with differential weighting of the seven signs quite accurately predicted each radiologist's judgements. And when radiologists disagreed in their diagnoses we could then trace that to the fact that they were weighting these signs differently.

A few years later, one of my colleagues, Lew Goldberg, demonstrated in another judgment task that if you replaced the judge with a model applied by a computer, you often could out-predict the judge on a new set of cases.[2] This occurred because to the extent that the judge was doing something valuable, the model would apply that process consistently, where humans have error in their ability to apply their own policies.

We were very aware at that time of the work by Ledley and Lusted, much along the same lines, trying to evaluate the reliability and validity of medical judgments. And I'm very proud to say that in my voluminous filing system—I don't throw much away—I was able to find a letter that I wrote to Lee Lusted dated June 2, 1967, thanking him for coming down to Eugene and talking with us about his work and actually helping us in some of the reporting of our related work. I know Lee is very important to this society, and I'm glad my filing system came through.

Now to the path of this talk. After that early start in medical decision making, I strayed and went back to my earlier work on risk and studies of gambles. But I hope that this work is also relevant to medical decision making. You can be the judge later.

Thinking Fast and Slow: Deficiencies in Both Modes

Much of my work relates closely to Danny Kahneman's famous book, *Thinking, Fast and Slow*.[3] I think it's sold

more than 10 million copies by now—a remarkably successful volume summarizing a lot of the work in the field of decision making. Basically, he says we think in two ways: fast, intuitive, based on feelings (which we refer to as affect). Images, stories, and direct experiences are very much influential in this fast mode of thinking. And then we have the slow, deliberate mode that we are taught to do in school, to think logically and to use arguments, reasons, equations, mathematics. Both are highly rational, and both make serious mistakes.

The Affect Heuristic

The affect heuristic—I'll talk a little bit about that as a lead-in to further work on the fast and slow systems.[4,5] I have a very simple definition of affect: it's a feeling of goodness or badness associated with a stimulus. We code information very quickly as something that is good or bad. Some of this coding may be innate, but most of it is learned through experience or our culture.

The affect heuristic had its origins in the risk perception work that Sarah Lichtenstein, Baruch Fischhoff, and I did around 1980, where we found that judgments of risk from different activities and technologies were closely related to people saying that "thinking about this hazard evokes a feeling of dread in me."[6] Dread was the most powerful predictor of perceived and acceptable risk. We didn't think too much about this except that it was an interesting finding.

We also observed that perceived risk and perceived benefit were inversely related across hazards. We noted this finding incidentally and didn't do anything with it at the time. The reason this is interesting is because in the world, risk and benefit tend to be positively correlated across different hazardous activities. If something is high in benefit, it could be low in risk or high in risk, but it's rare that we have something that's low in benefit and high in risk. So, that part of the risk/benefit space is sparsely populated leading to a positive correlation between risk and benefit across different hazardous activities.

But if you ask people to judge risk and benefit for each of these hazards you get a very different picture. You get a strongly negative relationship. We wondered about why that was. We didn't do much research on this until a few years later; I had a graduate student, Ali Alhakami, who did a thesis investigating this. He found that the inverse negative relationship between risk and benefit for any hazard, say, for example, nuclear power, depends on the degree to which that activity is judged to be good or bad.[7] So, you see the affective aspect coming into these judgments.

For example, consider two activities that expose us to radiation. One that many people feel is a bad source of

radiation is nuclear power. People judge its benefit to be low and its risk to be high. For a more positively viewed source of radiation, medical X-rays, the benefits are judged to be high and the risks are judged to be low. The same thing happens with chemicals. We have the bad chemicals, pesticides, judged low in benefit and high in risk, and the good chemicals, medicines and prescription drugs, judged high in benefit, low in risk. This is the kind of responding that leads to that inverse relationship between perceived risk and benefit.

This led us to conjure up a concept called the affect heuristic, which basically says that feelings come first and then we derive our judgments of risk and benefit based on those feelings, and we make the judgments coherent, going in opposite directions. But more generally, beyond risks and benefits, judgments and decisions of many kinds are influenced by reference to an overall affective evaluation of the stimulus that we're thinking about.

So, affect has been studied in many different domains. Marketers, for example, have specialized in understanding the role of feelings and trying to create positive images and feelings for products.

Here are a few examples of how the affect heuristic influences us. One involves the difference between probability and frequency frames in communicating risk. Another is a concept referred to as pseudocertainty. Third is something we call an affective lure. I'll illustrate each of these.

Consider probability and relative frequency in risk communication. Are they the same or different? For example, you can have something that has a 20% chance of happening, or it could happen 20 times out of 100. In work with Ellen Peters, John Monahan, and Don MacGregor, we found that people respond differently to these different framings of the same information.[8]

We studied a task that was based on a judgment that psychiatrists and psychologists were making about people who were hospitalized for mental problems: Is it safe to release that person to the community? Might they be dangerous to themselves or others?

Our scenario described a hypothetical patient, James Jones, who, the decision makers were told, had been evaluated for discharge. A respected psychologist had done an assessment of Mr. Jones and concluded—and then we had two conditions—that patients similar to Jones are estimated to have a 20% probability of committing an act of violence to others during the first several months after discharge, or of every 100 patients similar to Jones, 20 would be estimated to be violent after the first several months of discharge.

Our study participants were psychiatrists and psychologists who made these kind of decisions. We asked them, "If you were a supervisor, would you discharge Jones?"

We found that, if they were given information in the frequentist format, they were twice as likely to say don't discharge Jones. Twenty out of 100 apparently seemed much riskier than 20% probability.

We did further studies. In one we had 10% chance of violence versus a 1 out of 10 chance as the two frames. We asked people to think out loud while they were making this judgment about dangerousness. When they were thinking about 10%, we found that their thoughts were mainly about the number—very few people are violent, or how big or small was 10%? But if they saw the frame 1 out of 10, they were often thinking about one person being violent. "He could be the 1 out of 10." "Some guy going crazy, killing people." "The patient attacking someone." These images convey strong affective feelings, which become the representations of risk, and that's likely what led the two logically identical frames to produce different decisions about discharging the patient.

Ellen Peters later found that this effect was driven by people who were low in numeracy. People who are high in numeracy skills see 10% and 1 out of 10 as the same, but those lower in numeracy do not.

Another affective bias is *pseudocertainty*. A long time ago, I did a little experiment asking people to think about being vaccinated against two different strains of the flu.[9] These two were equally likely. One vaccine gave 100% protection against one of the strains, which was half the problem. And the other one gave 50% protection against both strains. People preferred the 100% protection over half the problem rather than 50% protection against the whole problem.

Later, Meng Li and Gretchen Chapman replicated and extended this study and found the same result.[10] One hundred percent of anything looks good, even if it's an illusory 100%. Again, you see feelings induced by the description influencing the judgment. People overweight certainty, these investigators said, even when certainty is only an illusion.

More recently, we've been looking at what we call an affective lure. This is based on research by Cynthia Cryder, followed up by Teliha Kogut in Israel.[11] There are four children being considered for surgery for cleft palate and the respondent is asked to select one as the top priority for surgery as resources are limited. One child has the least serious defect but is judged physically more attractive. About 28% of a control group that weren't given any other instruction chose that child for surgery. When a second group was asked to think carefully before they made this judgment, selection of the least needy child dropped to 21%.

Then Tehila Kogut introduced introspection. Introspection can be considered as decision analysis lite. We can't always have an analyst at our side to help us determine our preferences and decisions. But a brief moment

of introspection about what should be important to our decision might actually be useful. Kogut asked people before they made this judgment to pause and to rate the importance of each of four considerations that might be relevant: the severity of the cleft palate, the need for surgery, feeling of empathy toward the child, and how touching is the child's appearance. In that group, only 11% chose the least needy child for surgery.

A fourth group was not given these four attributes to think about and rate, but were instructed to "formulate your own list about what you think is important here before you make this decision." In this group, only 4% chose the least needy child. So, something easy we might all do before making a decision is to slow down and think a little bit about what should be important for that decision.

Normative and Descriptive Models for Valuing Lives

Now I'm going to switch to valuing and devaluing lives with fast and slow thinking. Fast thinking, relying on what we might call our gut feelings, is our default mode of thought. It's easy, it feels right, and it usually works, but it can lead to serious mistakes. One of these mistakes can be characterized as "the more who die, the less we care." Our president is famous for relying on his gut and making fast decisions, and some of these haven't turned out very well.

Slow thinking can accomplish miracles, but, it too, can lead to serious biases and poor decisions when valuing lives. There's something called *the prominence effect* that I'll describe, and then I'll discuss something called *virtuous violence*, where slow thinking leads us to decide that certain lives are deserving of punishment rather than protection.

I'd like to introduce something called *the arithmetic of compassion*.[12] It comes from a poem by a Polish poet named Zbigniew Herbert. I won't read you the poem, but I'll describe what the phenomenon is. When we're thinking fast and relying on feelings, what we have discovered is that our feelings are innumerate—they can't count. Saving one life is huge. Saving a second life, 1 + 1, feels less important than saving two, and sometimes it feels less important than saving one. Feelings don't multiply either.

Here's an example by Nobel Prize winner biochemist Albert Szent-Györgyi who became worried about nuclear war. He said,

> 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.

That is what happens when you are relying solely on your feelings, you can't appreciate the seriousness of situations where many lives are at risk. But we can appreciate scale if we use the parts of our brain that know how to do arithmetic.

Consider two important questions. How *should* we value the protection of human lives and how *do* we value the protection of human lives? Here are two normative models that we might believe answer the *should* question (Figure 1). One is just a simple model that assumes every life is intrinsically of equal value, so as the number of lives at stake increase, the overall value of protecting them just adds them up as represented by a linear function. A tweak on that occurs when you are getting to a tipping point where the next lives lost would lead to extinction of a group or a species. Then those lives become even more valuable to protect than the ones that came before them and the value function curves upward in a nonlinear fashion. So, those are two possible normative models that we might want to ascribe to.

But our actions in the face of catastrophic threats don't seem to follow either of these normative models, and this in part is because our feelings override our analytic judgments. These feelings value individual lives greatly but tend to be insensitive to large losses of life.

Research finds support for two descriptive models that tell us how we do value the saving of human lives (Figure 2). One model starts strong with small numbers of lives, and then becomes insensitive to additional increases. But we also find that as the number of lives at risk increases, it's not just that we just become insensitive to any additional lives, we actually start to care less about what is going on.

In the first model, the difference between zero and one life is huge. If we are relying on our feelings, the second life doesn't feel that it adds as much value as the first. And if we contemplate a situation that we're told might lead to 87 deaths, and then suddenly someone says no, it's 88, you won't feel any different. These numbers are on the flat part of the value function when you're guided by your feelings.

The importance of the first life is something that's been called the singularity effect. We place great value on the saving of individual lives. Mother Teresa illustrates that with her famous saying, "If I look at the mass I will never act. If I look at the one, I will."

I collect newspaper articles that demonstrate this singularity effect. In one photo, a pickup truck went into a pond. A passerby saw it, went into the water at some risk to his own life, and rescued the driver. It happens all the time.

It doesn't even have to be a human that we rescue. A dog was on a ship in the Pacific. The ship had engine trouble. They got all the people off the ship and let the ship drift away. Then they realized that there was a dog still left on the ship. This newspaper report describes a $300,000
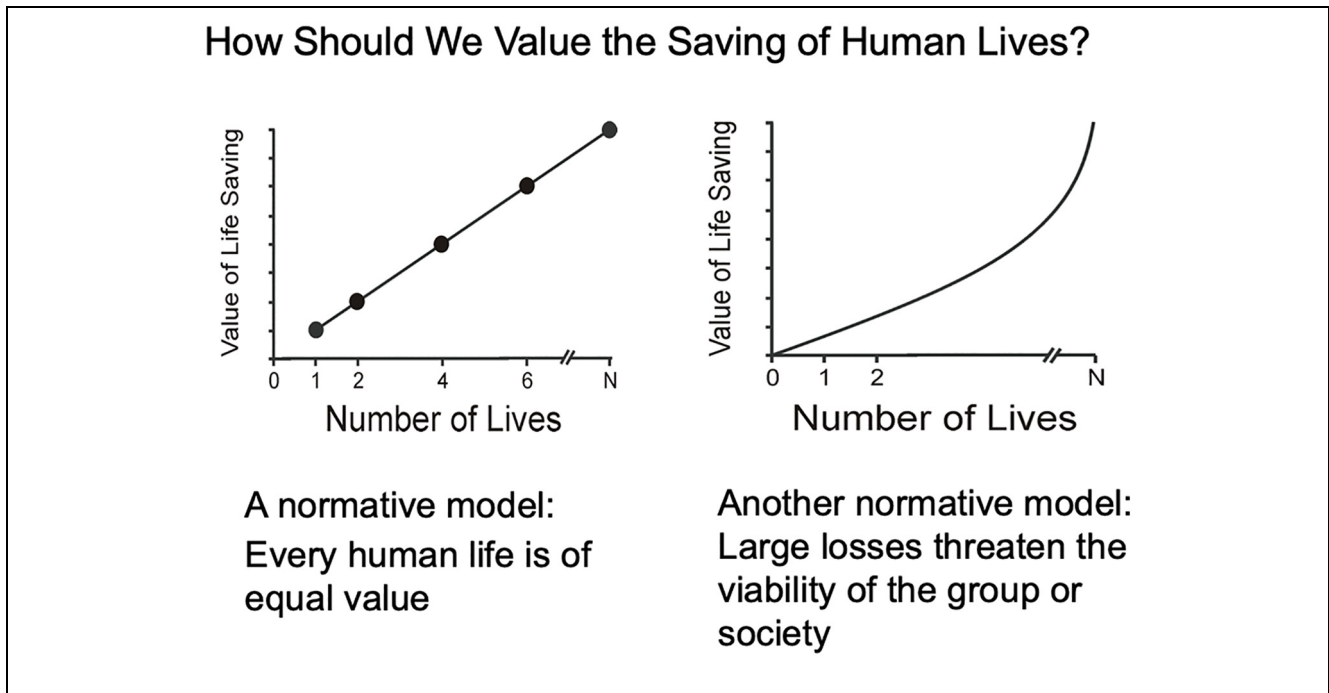
Figure 1 Two normative models for the valuing of human lives.
Source. Slovic P. "If I look at the mass, I will never act": psychic numbing and genocide. *Judgment and Decision Making*. 2007;2(2):79–95.

Figure 2 Two descriptive models for the valuing of human lives.
Source. Slovic P. "If I look at the mass, I will never act": psychic numbing and genocide. *Judgment and Decision Making*. 2007;2(2):79–95.
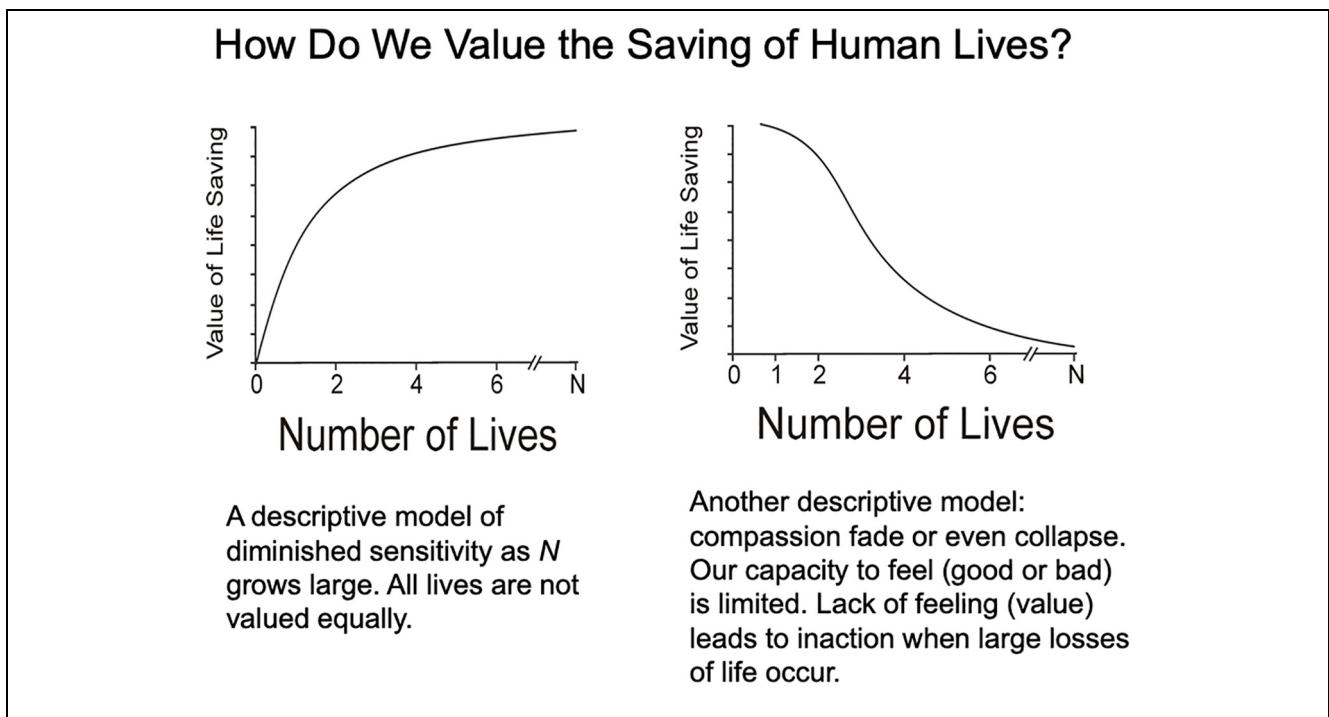
rescue effort to find the ship and save the dog. So, individual lives, human or not, are clearly very important.

Inadvertent Devaluing: Fast Thinking, Psychic Numbing, Prominence, and the Arithmetic of Compassion

But opposite singularity is psychic numbing and compassion fade or collapse, very dramatically illustrated by the genocide in Rwanda in 1994 where about 800,000 people were murdered in 100 days. The world knew about this, watched from afar while it happened, and basically did nothing to stop it. Over the years, there have been numerous episodes of genocide and mass atrocities where little was done to intervene and stop the bloodshed.[13]

There is research documenting this deadly arithmetic of compassion. A study by Tehila Kogut and Ilana Ritov in Israel illustrates the collapse of value that I described earlier.[14] Their experiment showed a picture of eight children in need of $300,000 for cancer treatment and people were asked to donate for this. In other separate conditions, they took individual children out of the group photo. Each child was said to need $300,000 for treatment, and donations were requested. They found that the donations were much higher for single children than for the eight.

My colleagues and I have conducted other studies showing that this decline in compassion may begin—ever so slightly—even with two lives. We don't concentrate our attention as closely on two people at risk. When our attention gets divided, our feelings are lessened, and we may respond less to two people than to one individual. This decline may continue as the number of lives at risk increases.

But numbing resulting from fast thinking isn't the only challenge to valuing lives when there are many lives at stake. Even slow, reasoned decision making requiring tradeoffs can be severely biased, causing our actions to contradict our stated values. There's something called the prominence effect that helps explain that.

The prominence effect evolved out of a failed experiment that I did in 1961.[15] I didn't trust the data and didn't publish it until 1975, when I finally did the experiment in a way I had confidence in. People were asked to make two objects equal in value. These objects had two dimensions. One object was better in one way, and the other one was better in the other way, and the study participants were supposed to make them equal. I did this because I wanted to make it easy to cause preference reversals by introducing other options into the choice set. This didn't work because even though people supposedly equated the two objects, they had consistent, strong, and unmovable preferences between them. I found that they seemed to break this difficult choice by going with the option that was better on what was intrinsically the more important dimension. This led to 80% to 85% choice of one object in a pair, even though the two had been constructed by the decision maker to be equal in value for him or her.

In 1988, Amos Tversky and Shmuel Sattath became interested in this result.[16] We did further research on this, renamed this phenomenon the prominence effect, and asserted that choices or decisions value prominent dimensions extremely highly because of the need to justify or defend such actions. When you state or express your values, you typically don't have to justify them. You say this is what is important to you and people take you at your word. But when you make a choice, you often have to defend to others or even to yourself why you are making that choice. So, as a result, there may be a disconnect between our stated values and the values revealed by our actions, the latter being altered by the need to defend them.

This is very dramatically illustrated in humanitarian crises like genocides and mass atrocities, where you have a government like the United States that says it has a responsibility to intervene in such humanitarian crises and try to halt or prevent them. But for governments, national security is the most prominent—that is the most defensible—value in today's world. And strongly held humanitarian values, as stated preferences, tend to decline or even collapse when they are pitted in decision making against security objectives.

So, when humanitarian lifesaving and national security seem to conflict, we do not intervene to prevent genocide or mass atrocities, no matter how many thousands or millions of lives hang in the balance.[17] Prime examples are our indifference to what happened in Darfur and other continuing atrocities in Sudan, Yemen, Syria, and other parts of the world today.

Consider a compensatory model weighing various security objectives against different ways that foreign lives are important to protect in order to decide whether to intervene in a genocide. But prominence is not a compensatory model like this. Suppose that the balance tips toward security and thus not intervening when 100,000 lives are at risk. But you learn that instead of 100,000 lives, there are a million lives at risk. It likely won't change the decision as the prominence effect is not a compensatory model.

Attention is a limited resource. We simplify complex tradeoffs by focusing on prominent objectives and choosing so as to obtain them. Prominence is like an

attentional spotlight. Nonprominent aspects are neglected. Out of sight, out of mind.

There are numerous examples of security prominence from our political world. Barack Obama, who truly cared about humanitarian abuses, said, "I have a solemn responsibility to keep the American people safe. That's my most important obligation as president and commander-in-chief."

But Obama did not often intervene to halt atrocities. For example, Fred Hiatt of the *Washington Post* noted in 2013, "While acknowledging 'very real and legitimate' humanitarian interests in Syria—after 80,000 people had been killed and millions had lost their homes—Obama recently said his 'bottom line' has to be 'what's in the best interest of America's security.'"[18] Because we felt there were political costs with going into Syria and trying to stop the slaughter, we did not do that.

Psychic numbing and security prominence are even more evident in warfare than in indifference to humanitarian crises. Recently, I was asked to start thinking about issues regarding the use of nuclear weapons, and what I learned in researching this was that psychic numbing and security prominence are even more strongly evident in decisions about warfare than in decisions about genocide.[19]

In World War II, General Curtis LeMay orchestrated a firebombing campaign against more than 60 Japanese cities, killing hundreds of thousands of Japanese civilians, 100,000 in Tokyo in one night. Only Kyoto, Hiroshima, and Nagasaki were spared, Kyoto because it was a sacred city and Hiroshima and Nagasaki because they were saved for the atomic bomb. True to numbing and security prominence, LeMay observed, "Killing Japanese didn't bother me very much. . . . It was getting the war over that bothered me. So I wasn't particularly worried about how many people we killed."

Daniel Ellsberg recently wrote a book about his experience as a nuclear war planner during the 1960s.[20] He described many instances of the way strategists were thinking about the use of nuclear weapons. They had plans ready to kill hundreds of millions of people in the event of a nuclear attack on the United States.

The incoherence between the singular importance of protecting individual lives and the acceptability of mass killing in warfare is brought home in the much ridiculed proposal by a lawyer named Roger Fisher, who proposed that the secret code that the president needs to initiate a nuclear attack be implanted near the heart of a person whose life would have to be sacrificed to begin the process of killing millions.[21] People were appalled at the brutality of killing the person with the code.

Deliberate Devaluing through "Virtuous Violence"

After many years of studying how to increase compassion, the topic of nuclear war got me and my colleagues thinking about what might be called anti-compassion. Much deliberate harm is perpetrated by those who believe their actions are virtuous and the victims are to blame for their fate. We've recently conducted a couple of online surveys that illustrate some of this. Basically, the point is that social, cultural, and political attitudes drive policies and decisions that devalue and harm human lives. We studied five harmful actions and policies and found them to be tightly connected. They are bound together by a desire to punish others who one judges to be bad and thus deserving to be dealt with harshly. This badness is a result of perceiving the other to be a dangerous enemy intending to harm oneself or one's country as in the case of warfare; or it could be that they are a criminal or a murderer, or they're immoral, or they're a threat to one's social, cultural, or economic status or security. There are many paths to thinking someone deserves punishment.

This recent research started with a study by Scott Sagan and Ben Valentino, who in 2017 published an article, "Revisiting Hiroshima in Iran: What Americans Really Think about Using Nuclear Weapons and Killing Noncombatants."[22] They surveyed Americans using a hypothetical scenario about a difficult ground war between the United States and Iran. The war was not going well, and it was estimated that 20,000 American military deaths might be expected if we continued it. Survey respondents were asked whether they approved of the United States dropping a nuclear bomb on the second largest city in Iran to bring an end to the war and protect our troops. They were told this might kill 100,000 Iranian civilians. In a second survey, that 100,000 was raised to 2 million Iranian civilians. Their results were quite shocking. A high percentage of Americans supported the nuclear strike. Support for the death penalty in domestic cases regarding convicted murderers—another question in the survey—strongly predicted support for nuclear killing. Republicans were more in favor of the nuclear option than Democrats.

My colleagues and I decided to replicate and extend this survey, adding other punishing policies besides the death penalty into the mix of things we asked about.[23] Interestingly, we used these same nuclear scenarios, killing 2 million civilians in one case and 100,000 in the other—and this didn't make any difference. Consistent with what Sagan and Valentino had found, the approval

rates of using nuclear weapons in the two scenarios were basically the same, illustrating psychic numbing.

The five punishing attitudes that we investigated were whether or not you approve of killing enemy civilians with nuclear or conventional weapons, whether you support anti-abortion or oppose anti-abortion policies, whether you support or oppose the death penalty for serious crimes, whether you support or oppose gun control, and whether you support or oppose harsh anti-immigration policies. The pattern of our results matched and extended those of the Sagan and Valentino survey.

The percentage of people who approved of the nuclear strike, possibly killing up to 2 million people, was moderated by certain characteristics of the respondents. About 55% of Republicans and conservatives supported the nuclear strike compared to 15% of Democrats and liberals. About 60% of those who said that they would vote for President Trump next year supported the nuclear strike compared to 19% among those would not vote for Trump. Interestingly, the other attitudes, like protecting the right to own guns, supporting anti-abortion legislation, approving harsh immigration raids, and favoring the death penalty, also predicted approval for using nuclear weapons, almost to the same extent as did the political characteristics.

We also could turn this around and look at the percentage who said that separation of parents and their children at the border was acceptable. You see the same characteristics strongly predicting the approval of separating parents and children. Republicans, conservatives, Trump voters, and people who supported these four other punitive policies were far more likely to approve of separating immigrant parents and children.

We calculated a *punishment score* for each person in the survey. One point was given for opposing abortion, supporting the death penalty, opposing gun control, and supporting government raids on immigrants. Scores ranged from zero to four. We related the score to whether or not you approved of using a nuclear weapon to kill as many as 2 million Iranian civilians. Among people who supported none of these other four actions, only about 8% supported the nuclear strike. The more of these punishing policies one endorsed, all of which are irrelevant to approving the use of nuclear weapons, the higher the approval rate for the nuclear strike, reaching 66% among those who approved all four of the other policies.

Across diverse domains, there appears to be a desire to punish others who are threatening or offensive to us. Such actions typically are defended as virtuous, and we saw that in our survey. People who approved the strike said it was ethical and the Iranians deserved their fate because they started the war.

A book by Fiske and Rai titled *Virtuous Violence* argues that most perpetrators of violence believe they are doing the right thing, defending something of value and blaming the victims.[24]

So, what is my point about all this recent work? These data show that nonrelevant political and sociocultural biases, combined with psychic numbing and security prominence, create support for decisions and policies that devalue the lives of millions. This raises the question: How do we combat this?

Another question is whether such sociocultural and political biases might affect medicine. Might they influence the accessibility and quality of care given to patients of less favored races, ethnicities, ages, or genders? If so, what can be done to understand and address this?

Conclusions

We are inconsistent and sometimes incoherent in our valuation of human life. We value individual lives greatly, but these lives lose their value when they become part of larger crisis. As a result, we do too little to protect human lives in the face of catastrophic threats from violence, natural disasters, and other causes. In medicine, this may pose difficult choices when treating individual patients with expensive therapies that keep hope alive but are not cost effective for the population, for example with end of life care.

Lifesaving judgments and decisions are highly context-dependent, subject to many forms of response mode and framing effects and affective biases. This has implications for risk communication and the concept of shared decision making. Slower, more introspective decision making, as in the cleft palate example, may reduce some of the affective biases associated with fast, intuitive decisions. But slow thinking can also induce serious biases as can occur with the prominence effect.

Understanding the strengths and weaknesses of fast and slow thinking is a necessary first step toward valuing lives humanely and improving decisions.

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Supplemental Material

Supplementary material for this article is available on the *Medical Decision Making* Web site at http://journals.sagepub.com/home/mdm.

References

1. Hoffman PJ, Slovic P, Rorer LG. An analysis-of-variance model for the assessment of configural cue utilization in clinical judgment. *Psychol Bull.* 1968;69(5):338–49.
2. Goldberg LR. Man vs. model of man: a rationale, plus some evidence, for a method of improving on clinical inferences. *Psychol Bull.* 1970;73(6):422–32.
3. Kahneman D. *Thinking, Fast and Slow.* New York: Farrar, Straus & Giroux; 2011.
4. Slovic P, Finucane ML, Peters E, MacGregor DG. The affect heuristic. In: Gilovich T, Griffin D, Kahneman D, eds. *Heuristics and Biases: The Psychology of Intuitive.* New York: Cambridge University Press; 2002. p 397–420.
5. Slovic P, Peters E, Finucane ML, MacGregor DG. Affect, risk, and decision making. *Health Psychol.* 2005;24(4S):S35–S40.
6. Fischhoff B, Slovic P, Lichtenstein S, Read S, Combs B. How safe is safe enough? A psychometric study of attitudes towards technological risks and benefits. *Policy Sci.* 1978;9:127–52.
7. Alhakami AS, Slovic P. A psychological study of the inverse relationship between perceived risk and perceived benefit. *Risk Anal.* 1994;14(6):1085–96.
8. Slovic P, Monahan J, MacGregor DG. Violence risk assessment and risk communication: the effects of using actual cases, providing instruction, and employing probability versus frequency formats. *Law Hum Behav.* 2000;24(3):271–96.
9. Slovic P, Fischhoff B, Lichtenstein S. Response mode, framing, and information-processing effects in risk assessment. In: Hogarth R, ed. *New Directions for Methodology of Social and Behavioral Science: No. 11. Question Framing and Response Consistency.* San Francisco: Jossey-Bass; 1982. p 21–36.
10. Li M, Chapman GB. "100% of anything looks good": the appeal of one hundred percent. *Psychon Bull Rev.* 2009;16(1):156–62.
11. Cryder C, Botti S, Simonyan Y. The charity beauty premium: Satisfying donors' "want" versus "should" desires. *J Marketing Res.* 2017;54(4):605–18.
12. Slovic S, Slovic P. The arithmetic of compassion. *The New York Times.* Available from: https://www.nytimes.com/2015/12/06/opinion/the-arithmetic-of-compassion.html
13. Slovic P. "If I look at the mass I will never act": psychic numbing and genocide. *Judgment Decis Making.* 2007;2(2):79–95.
14. Kogut T, Ritov I. The "identified victim" effect: an identified group, or just a single individual? *J Behav Decis Making.* 2005;18(3):157–67.
15. Slovic P. Choice between equally valued alternatives. *J Exp Psychol.* 1975;1(3):280–7.
16. Tversky A, Sattath S, Slovic P. Contingent weighting in judgment and choice. *Psychol Rev.* 1988;95:371–84.
17. Slovic P. The prominence effect: confronting the collapse of humanitarian values in foreign policy decisions. In: Slovic S, Slovic P, eds. *Numbers and Nerves: Information, Emotion, and Meaning in a World of Data.* Corvallis: Oregon State University Press; 2015. p 53–61.
18. Hiatt F. Obama's lean inward poses risk for US interests abroad. *The Washington Post.* Available from: https://www.washingtonpost.com/opinions/fred-hiatt-obamas-lean-inward-poses-risk-for-us-interests-abroad/2013/05/19/8cc5231c-bd6d-11e2-97d4-a479289a31f9_story.html
19. Slovic P, Lin H. The caveman and the bomb in the digital age. In: Effects of the global information ecosystem on the risk of nuclear conflict. Workshop conducted at: the Center for International Security and Cooperation, Stanford University; September 7, 2018.
20. Ellsberg D. *The Doomsday Machine: Confessions of a Nuclear War Planner.* New York: Bloomsbury; 2017.
21. Fisher R. Preventing nuclear war. *Bull Atomic Scientists.* 1981;37(3):11–7.
22. Sagan SD, Valentino BA. Revisiting Hiroshima in Iran: what Americans really think about using nuclear weapons and killing noncombatants. *Int Security.* 2017;42(1):41–79.
23. Slovic et al., unpublished data.
24. Fiske AP, Rai TS. *Virtuous Violence.* Cambridge (England): Cambridge University Press; 2015.