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A policy maker's dilemma: Preventing terrorism or preventing blame

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ABSTRACT

Although anti-terrorism policy should be based on a normative treatment of risk that incorporates likelihoods of attack, policy makers' anti-terror decisions may be influenced by the blame they expect from failing to prevent attacks. We show that people's anti-terror budget priorities before a perceived attack and blame judgments after a perceived attack are associated with the attack's severity and how upsetting it is but largely independent of its likelihood. We also show that anti-terror budget priorities are influenced by directly highlighting the likelihood of the attack, but because of outcome biases, highlighting the attack's prior likelihood has no influence on judgments of blame, severity, or emotion after an attack is perceived to have occurred. Thus, because of accountability effects, we propose policy makers face a dilemma: prevent terrorism using normative methods that incorporate the likelihood of attack or prevent blame by preventing terrorist attacks the public find most blameworthy.

Introduction

The events of September 11, 2001 led to unprecedented changes to US government anti-terror policy. In the largest government restructuring in recent history, the United States created the Department of Homeland Security (DHS) primarily to "(A) prevent terrorist attacks within the United States; (B) reduce the vulnerability of the United States to terrorism; and (C) minimize the damage, and assist in the recovery, from terrorist attacks that do occur within the United States" (Homeland Security Act of 2002). One of the many responsibilities of the DHS is the allocation of funds for the prevention of and response to terrorist attacks.

Normative approaches to anti-terror policy

The DHS promotes a risk-focused approach to its budgeting activities by consulting experts regularly about the likelihood, vulnerability and consequences of various terrorist acts and how threats can be reduced. To assist in that endeavor the DHS, for example, has funded an interdisciplinary research center, the Center for Risk and Economic Analysis of Terrorism Events, at the University of Southern California. To guide a course of action, normative methods, such as decision analysis, weight the (dis)utilities of various terrorist acts by perceived likelihoods (Edwards, Newman, Snapper, & Seaver, 1982; Keeney, 1977, 1988). Game theory also provides methods for modeling not only the strategies of the terrorists but also how those strategies would change based on the government's anti-terror strategies (Bier, 2006; Keohane & Zeckhauser, 2003; Sandler & Arce, 2003; Sandler & Lapan, 1988).

Although we expect that in principle the public supports a normative approach to anti-terror policy, as we detail below, we suspect that in practice the public will largely neglect normative likelihood considerations when judging the actions of policy makers.

Probability neglect and anti-terror policy

A substantial literature documents how people tend to underweight or wholly neglect likelihoods in their risk judgments. For instance, people have particular difficulty dealing with probabilistic information for small likelihood events, like those for terrorist attacks. They have a hard time gauging how concerned to feel about a 1 in 100,000 likelihood of death without a context to evaluate the likelihood, and thus, people do not know whether the risk is large or small. People, for instance, could not distinguish the relative safety of a chemical plant that had an annual chance of experiencing a catastrophic accident that varied from 1 in 10,000 to 1 in 1 million (Kunreuther, Novemsky, & Kahneman, 2001).

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Further, people underweight likelihood information when faced with emotionally arousing judgments and choices (Kahneman, Ritov, & Schkade, 1999; Loewenstein, Weber, Hsee, & Welch, 2001; Slovic, Finucane, Peters, & MacGregor, 2002). Changes in probabilities, for instance, have little influence on emotional reactions to a variety of events, from receiving electric shocks (Bankahart & Elliot, 1974; Monat, Averill, & Lazarus, 1972; Snortum & Wilding, 1971) to winning lotteries (Loewenstein et al., 2001). Moreover, increasing the emotional salience of an event can reduce the influence of likelihoods on choice decisions (Rottenstreich & Hsee, 2001; but see McGraw, Shafir, & Todorov, 2010). For instance, people will pay more for flight insurance that compensates for losses due to terrorism than for flight insurance that compensates for losses due to any reason – even though the likelihood of the former is lower than the latter (Johnson, Hershey, Meszaros, & Kunreuther, 1993). And in the wake of September 11th, a fear of flying led more people to travel by car, which increased traffic fatalities (Gigerenzer, 2004).

Of relevance to our inquiry is research by Sunstein (2003) that documents how the fear of terrorism creates probability neglect. As a result, the public appears more concerned about highly unlikely terrorist acts than common yet mundane risks like traffic or consumer safety. Sunstein makes the argument that probability neglect puts the public in greater jeopardy because the government responds to public opinion by moving resources away from addressing public safety issues to preventing terrorist attacks (even though the shift cannot be justified by weighting potential consequences by their likelihood of occurrence; see also Mueller, 2006).

Blame

Of particular interest to our inquiry is the way that the public makes blame judgments and the influence this process has on policy makers. Research on judgments of blameworthiness is relevant to our contention that people often fail to take into account the likelihood of a terrorist attack when judging officials for failing to prevent the attack. For instance, theories of blame and responsibility posit that people are highly influenced by an outcome's severity (Alicke, 2000; Fiery, 2008; Robbennolt, 2000). The now classic study by Walster (1966) shows that the blameworthiness of a driver increased with the severity of the outcome of an accident, even when identical actions led to the accident – an outcome bias that persists even in within-subject manipulations of severity (Mazzocco, Alicke, & Davis, 2004; but see Tetlock et al., 2007). People also ascribe more blame in situations when the blameworthy outcome elicits greater negative emotions (Alicke, 2000). The connection between negative emotions and blame is well-documented in juror decision-making (Feigenson & Park, 2006). For instance, gruesome photographs presented by the prosecution to jurors in mock trials caused greater emotional arousal, in particular anger toward the defendant, which increased judged culpability (Bright & Goodman-Delahunty, 2006).

Based on outcome bias research, we suspect that the public's natural tendency to focus on outcomes and their severity will override considerations of likelihood in their judgments of anti-terror policy priorities and the blameworthiness of anti-terror failures.

Policy maker responses to the public's probability neglect

Democratic systems of government demand that elected and appointed officials are responsible to citizens for their actions, and thus accountability can encourage or deter normative thought (Lerner & Tetlock, 1999). Despite their experience and stature, politicians are not immune to accountability effects. The tendency of the public to blame politicians is well-documented (Iyengar, 1991; Sniderman, Hagen, & Tetlock, 1986; Thompson, 1980) and accountability to the public and blame avoidance can influence voting decisions (Arnold, 1990; Kingdon, 1981; Weaver, 1986, 1988). Pressure from the public influences more than just votes, however. For instance, negative public opinion quickly led the government to shut down the Pentagon's plan for a futures market in which traders could bet on the occurrence of terrorist acts (Guggenheim, 2003; Lathem, 2003; Sunstein, 2003).

If the public's anti-terror preferences and tendency to blame the government neglect likelihood information, policy makers may be tempted to forgo a normative approach to risk in order to avoid blame. Alternatively, policy makers could employ a normative approach to anti-terror policy, but when necessary, head off blame by informing the public of likelihoods using risk communication techniques (Fischhoff, 2009; Slovic, 2000; Sunstein, 2003). Indeed, people often can be persuaded to attend to likelihood information (Margolis, 1993). For instance, although consumers do not think about the likelihood of product malfunctions when deciding to purchase warranties, they will use that information if it is presented to them explicitly at the time (Hogarth & Kunreuther, 1995). Thus, after a terrorist attack has occurred, policy makers could highlight the improbability of the attack in order to reduce blame on the government (Markman & Tetlock, 2000; McGraw, 1991, 2001). As an example, consider statements by the Bush administration after the 9/11 attacks that allude to the low likelihood of attack:

> "No one could have conceivably imagined suicide bombers burrowing into our society and then emerging all in the same day to fly their aircraft – fly US aircraft into buildings." – President George W. Bush (9/16/01)

> "I don't think anybody could have predicted that ... they would try to use an airplane as a missile, a hijacked airplane as a missile." – National Security Adviser Condoleezza Rice (5/16/02)

Although we suspect that providing likelihood information will be effective in influencing anti-terror preferences before a terrorist attack, we doubt that highlighting likelihoods will affect blame after an attack because of the robust effect that outcomes have on judgments. In addition to the outcome bias, the hindsight bias illustrates how perceptions of likelihoods often change after an event has occurred; people judge events that have occurred as more probable and events that have not occurred as less probable (Fischhoff, 1975). Again, research in jury decision-making is illustrative. Jury-eligible citizens were much more likely to find a railroad's actions negligent and an accident foreseeable in hindsight than in foresight (Hastie, Schkade, & Payne, 1999). Probability judgments of terror-related risks also appear susceptible to a hindsight bias. After a year without incident, people recalled their predicted likelihoods of terrorism to be more in line with a present, safer world (Fischhoff, Gonzalez, Lerner, & Small, 2005).

Outcome biases would seem to create a paradox for policy makers. Even if the public agrees before an attack that likelihood information should be used to make decisions, after an attack policy makers will be blamed based on the outcome of the attack, and not based on the attack's prior low likelihood. If this is true, policy makers may be tempted to deviate from a normative risk-based approach in order to prevent blame. We return to this dilemma in the general discussion.

Pilot study

To test our assumption that the public, in principle, supports a normative approach to anti-terror policy, we presented undergraduates five strategies that the DHS could use for anti-terror policy decisions and asked them to select the option that describes the process that the government should use when

making anti-terror policy decisions; percentage of respondents selecting each option is presented below ($N = 60$):

(17%): The DHS should budget to prevent attacks that have the most severe consequences.
(27%): The DHS should budget to prevent attacks that are most likely to occur.
(55%): The DHS should budget to prevent attacks based on a balance of the likelihood of attack and their consequences.
(1%): The DHS should budget to prevent attacks that the public would be most likely to blame the DHS for if they occurred.
(0%): The DHS should budget to prevent attacks that the public would find most upsetting.

A majority selected a normative approach that balanced likelihoods and consequences. The next highest percentage indicated that the DHS should stop attacks that are most likely to occur. To examine people's preference when likelihoods were pitted directly against consequences, we asked a separate group of undergraduates which of two strategies the DHS should use when making anti-terror policy decisions ($N = 38$). Respondents were more than twice as likely to advocate the use of likelihoods rather than outcomes when the DHS makes budget decisions:

(32%): The DHS should budget to prevent attacks that have the most severe consequences.
(68%): The DHS should budget to prevent attacks that are most likely to occur.

These findings suggest that the public endorses a normative approach to anti-terror activities in principle. Next we test whether the public will largely neglect normative likelihood considerations in practice.

Study 1

The US government appears keenly interested in stopping another 9/11 style attack. In 2009, the Transportation Security Administration (TSA) received 14% of the Department of Homeland Security's $50.5 billion budget (third only to the Coast Guard, and Customs and Border Patrol). The public also appears highly supportive of the government's efforts, as demonstrated by their patience in long airport security lines created in part by TSA personnel ensuring that liquid containers in carry-on bags are 3.3 ounces or less.

As a motivating example, we examine the relationship between likelihood judgments and blame judgments for a highly upsetting attack (an attack that resembles the 9/11 terrorist attack on the World Trade Center) that we suspect is perceived as less likely than another less upsetting attacks (a truck bomb or rocket launched attack). In a pilot test, we tested if a 9/11 style attack would be more upsetting than a truck bomb attack or a rocket launcher attack. Undergraduate students were shown twenty descriptions of various terrorist attacks and asked to judge how upset they would be if each attack occurred ($N = 41$; Appendix 1). Flying a commercial jet into a civilian target was judged the second most upsetting attack after the detonation of a nuclear device in a metropolitan area. A rocket launched attack and a truck bomb attack were ranked tenth and twelfth, respectively, out of the twenty attacks.

We asked people how much they would blame the government for failing to prevent various terrorist attacks and then, in an ostensibly unrelated study, respondents were asked to assess how likely these attacks were. Although the types of attack – using an airplane or a truck bomb – were described as achieving the same results, we expected that the attack involving an airplane would elicit stronger blame responses than the attack involving a truck loaded with explosives despite the fact that the latter would be perceived as more likely to occur.

Method

Participants

One-hundred and eleven undergraduate students at Princeton University participated in the study for a fixed payment that had no relationship to their responses.

Procedures

Participants took part in a 1-h long session involving numerous unrelated questionnaires. The two questionnaires of interest for the current study were placed at the beginning and end of the session.

The first questionnaire was presented as a study about potential terrorist actions and the responsibility of the government. Participants were asked how much they would blame the government for failing to prevent six potential terrorist attacks using a seven-point scale, ranging from 0 (not at all) to 6 (very much). The six questions always referred to six civilian objects (two high-rise buildings, two bridges, and two train stations): Empire State Building in NYC, Sears Tower in Chicago, Brooklyn Bridge in NYC, Golden Gate Bridge in San Francisco, Grand Central Station in NYC, and Union Station in Washington, DC. The questionnaire described three types of attacks: hijacking an airplane, loading a truck with explosives, and using a rocket launcher. These two features – type of civilian object and means of attack – were manipulated within-subjects. To make the objectives of the study less transparent and reduce demand characteristics, the combinations of means of attack and type of object were counterbalanced across participants. For example, one group of participants judged how much they would blame the government for failing to prevent striking the two high-rise buildings with a hijacked airplane, the two bridges with a truck loaded with explosives, and the two train stations with a rocket launcher. Participants were randomly assigned to one of the three sets.

In addition, one half of the participants were told that the attacks would kill about 50 people and the other half were told that the attacks would kill about 300 people. This between-subjects manipulation of the number of victims did not have any effect on judgments, which replicates scope insensitivity that occurs in many decision-making studies (Hsee & Rottenstreich, 2004; Kahneman et al., 1999). Thus, for ease of presentation, we ignored this factor in our presentation of the results.[1]

The second related questionnaire that participants were given was placed at the very end of the 1-h session. Participants were asked to rate the likelihood of different attacks from the perspective of a terrorist organization. The instructions read as follows:

> The federal government created the Department of Homeland Security to prevent terrorist attacks on the US. In fact, there are very serious concerns that terrorist organizations will attempt such attacks on American soil. Taking the perspective of a terrorist organization, please rate how likely it is that the organization will attempt the actions described below.

Responses were made on an 11-point scale, ranging from 0 (not at all likely) to 10 (extremely likely). Participants were asked to respond to all 18 combinations of means of attack and type of civilian object (3×6).

[1] As we show in subsequent studies, respondents are highly sensitive to information about the number of people affected by an attack when that information is presented within-subjects which highlights differences in casualties.

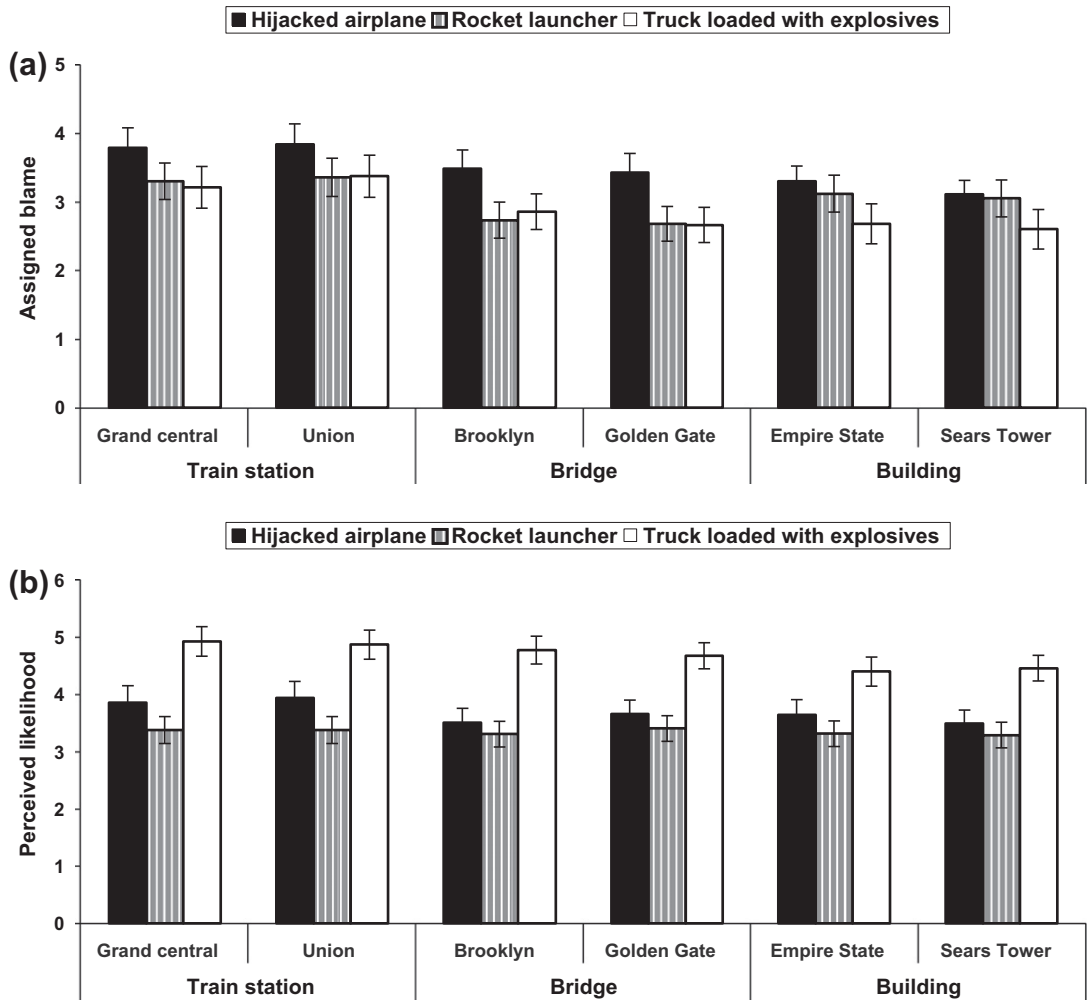

Fig. 1. (a) Blame assigned to the government for failing to prevent terrorist attacks as a function of the means of attack and the civilian target of attack (Study 1). (b) Perceived likelihood of terrorist attacks as a function of the means of attack and the civilian target of attack (Study 1). Error bars show standard errors.

Results and discussion

Participants blamed the government more if terrorists used a hijacked airplane ($M = 3.50$, $SD = 1.60$) than if they used a truck loaded with explosives ($M = 2.90$, $SD = 1.73$), $t(1\ 1\ 0) = 4.59$, Cohen's $d = 0.36$, or a rocket launcher ($M = 3.04$, $SD = 1.61$), $t(1\ 1\ 0) = 4.00$, $d = 0.29$. This effect is demonstrated graphically in Fig. 1a.[2]

For each potential target of attack, participants thought that terrorists would be more likely to use a truck loaded with explosives than a hijacked airplane or a rocket launcher (See Fig. 1b). This finding was confirmed by a 3 (means of attack) × 6 (type of object) repeated measures ANOVA.[3] The only significant effect was the type of attack, $F(2, 218) = 21.14$. Participants thought that terrorists were more likely to use a truck loaded with explosives ($M = 4.70$, $SD = 2.14$) than a hijacked airplane ($M = 3.69$, $SD = 2.40$), $t(1\ 1\ 0) = 5.05$, $d = 0.44$, or a rocket launcher ($M = 3.35$, $SD = 2.11$), $t(1\ 1\ 0) = 6.47$, $d = 0.64$.

We also explored the relationship between participants' blame and likelihood judgments. First, for each participant, we computed the blame and likelihood judgment for the three means of attacks averaging across the civilian objects and then correlated these judgments. As shown in Table 1, blame and likelihood judgments were nearly uncorrelated (r's = .06–.09). Second, we aggregated the blame and likelihood judgments across participants for each of the 18 combinations of targets and means of attack and then correlated these aggregated judgments at the level of these 18 events. The correlation was not significant ($r = -.19$).

Table 1
Correlations between participants' judgments of blame for failing to prevent terrorist attacks and judgments of perceived likelihood of such attacks (Study 1).

	Assigned blame			Perceived likelihood		
	Airplane[a]	Truck[b]	Rocket[c]	Airplane	Truck	Rocket
Assigned blame						
Airplane	–	.66*	.72*	.06		
Truck		–	.70*		.09	
Rocket launcher			–			.06
Likelihood						
Airplane				–	.57*	.42*
Truck					–	.47*
Rocket launcher						–

[a] These events involved the use of a hijacked airplane to strike a civilian object.
[b] These events involved the use of a truck loaded with explosives to strike a civilian object.
[c] These events involved the use of a rocket launcher to strike a civilian object.
* $p < .05$.

[2] Statistical tests are significant at $p < .05$ unless otherwise noted.
[3] Notice that this analysis could not be conducted on the analysis of blame judgments because of the counterbalancing schema. However, as can be seen from Fig. 1, for every potential target of attack, the direction of the difference between judgments involving an airplane attack and those involving a truck was the same.

The findings suggest that judgments of likelihoods of terrorist attacks and judgments of blame of the government for failing to prevent the attacks can be dissociated. That is, attacks that are perceived as more likely can simultaneously be perceived as less blameworthy. In the current study, respondents thought that terrorists would be more likely to strike a civilian object with a truck loaded with explosives than a hijacked airplane. At the same time, they were more willing to blame the government for failing to prevent the latter than the former attack.

Study 2

The findings of Study 1 suggest that two sets of considerations – likelihood and blame judgments – are largely independent. In our next study, we examined if blame is more strongly related to simulated budget priority decisions than likelihoods. To create a strong test of probability neglect, we used a sample of respondents, decision analysts, who are familiar and supportive of normative methods.

Method

Participants

Three-hundred and twenty-three members of the Decision Analysis Society volunteered to participate in a web-based survey on terrorism. The entire survey was completed by 293 individuals (18% women; age ranged from 22 to 89; mean age was 39 years). The sample was highly educated; 12.6% with bachelor degrees, 47.1% with master degrees, and 40.3% with doctoral degrees. The sample was evenly split between academic and industry settings.

Procedures

Participants were invited by email to participate in a study on terrorism. After responding to a series of demographic questions, they were randomly assigned to one of two conditions – a likelihood condition or a blame condition. In the blame condition, participants were asked to rate how much they would blame the government for failing to prevent each of 14 potential terrorist acts (Appendix 2) using a seven-point scale ranging from 0 (Not at all) to 6 (Very high). In the likelihood condition, participants were asked to rate the relative likelihood of each event occurring within the next three years using an eleven-point scale ranging from 0 (Not at all) to 10 (Very likely).

After completing the likelihood or blame survey, all participants read that "The Federal Government created the Department of Homeland Security (DHS) to prevent terrorist attacks on the US," and were asked to rate how much budget priority the DHS should give to each of the 14 attacks based on a five-point scale ranging from 1 (Very low) to 5 (Very high). The order of the attacks was randomized for each participant across all judgments.

Results

For each participant, we computed the correlation between their judgments of blame or likelihood and their judgments of budget priority. To conduct statistical tests, we transformed these correlations into Fisher z-scores.[4] The average correlation between blame and budget judgments ($r = .63$) was significantly higher than the average correlation between likelihood and budget judgments ($r = .23$), $t(2\ 6\ 1) = 7.86$ (see Table 2).[5] The results were identical when the analysis was limited to a) experienced decision analysts with 10 or more years of experience after obtaining their degree (.69 vs. .22 for the blame and likelihood judgment correlations respectively), $t(1\ 0\ 2) = 6.23$, b) the most educated analysts with doctoral degrees (.68 vs. .28), $t(1\ 0\ 4) = 5.37$, and c) the most educated and experienced analysts with doctoral degrees and 10 or more years of experience (.73 vs. .20), $t(5\ 9) = 4.90$.

Table 2
Correlations between judgments of blame and budget priorities for fourteen terrorist acts in Study 2 (top row of data), and correlations between judgments of perceived likelihoods and budget priorities (bottom row of data). Correlations in each column are shown separately for analyses conducted on individual judgments (individual) or group judgments (group).

	Budget (individual)	Budget (group)
Blame	0.63	0.89
Likelihood	0.23	0.10

We also computed the correlations between blame, likelihood and budgetary judgments for the aggregated (i.e., mean) judgments for each of the fourteen acts. That is, act was the unit of analysis. The blame judgments correlated much more strongly with the budget priority judgments ($r = .89$) than likelihood judgments ($r = .10$). We regressed the mean budget judgments (averaged across both experimental conditions) on the likelihood and blame judgments. Likelihoods and blame judgments accounted for 80.1% of the variance of the budget judgments. Although likelihood judgments were a significant predictor of budget judgments, $t(1\ 1) = 2.94$, blame judgments were a stronger predictor, $t(1\ 1) = 6.45$. In fact, blame judgments alone accounted for 64.4% of the variance in respondents' budget judgments, whereas likelihood judgments alone accounted for a mere 4.8% of the variance.

In summary, Study 2 revealed that anti-terror budget priorities were well-predicted by blame but not by perceived likelihoods. Although the sample of respondents advocate and often make their living using normative methods, when those methods are not salient or readily available, the decision analysts do not seem to spontaneously consider likelihoods. Thus, the study highlights the need to understand the conditions under which likelihoods will and will not influence anti-terror policy decisions.

Study 3

The previous studies suggest that although likelihood and blame judgments are largely independent, anti-terror budget priorities and blame judgments are highly related. We next examine how strongly likelihoods, blame judgments, and anti-terror priorities are related to the outcomes of an attack, its judged severity, and the emotional reaction it causes.

Method

Participants

One-hundred and fifteen adults (47% women; age ranged from 19 to 81; mean age was 53 years) from an online survey panel participated in the survey.

Procedures

The questionnaire was administered as part of a survey involving several unrelated questionnaires. The study used a 12 (type of attack; within-subjects) × 5 (type of judgment; between-subjects) mixed design ($n \sim 23$ per between-subjects condition).

First, participants were shown twelve potential terrorist attacks that were culled from the Department of Homeland Security's National Planning Scenarios (see Appendix 3), which ranged from a

[4] We could not compute the correlations for 10% of participants in the sample because these participants provided the same judgments for one or both sets of judgments (i.e., there was no variance in their data). Including them in the analysis does not affect our results in any qualitative way.

[5] We obtained the same results for a sample of undergraduate students who followed the same procedure.

cyber attack to the detonation of a nuclear device. Participants were assigned to one of five judgment conditions and were shown the twelve attacks again in random order. For each attack, the participants made a judgment on a seven-point scale with end points corresponding to their assigned condition: (1) how much the Department of Homeland Security should make preventing each of the acts a budget priority (“Very low” and “Very high”; *Budget*), (2) how much blame is placed on the government for failing to prevent the acts (“not at all” and “very much”; *Blame*), (3) how severe the consequences of the attack would be (“not at all” and “extremely”; *Severity*), (4) how upsetting the terrorist attack would be (“slightly upset” and “emotionally devastated”; *Emotion*), or (5) the relative likelihood of each event occurring within the next three years (“not at all” to “very likely”; *Likelihood*). A sixth condition was formulated by a research assistant who was unaware of our hypotheses. The assistant ranked the negative outcome of the attacks from highest (12) to lowest (1) based strictly on the number of casualties derived from the stimuli (*Casualties*).[6]

Results and discussion

We calculated the mean rating for each of the twelve terrorist attacks for each dependent variable condition. We conducted correlational analyses to examine the relationship between conditions. There were no outliers or influential data points in the data. Consistent with our prediction, we found that anti-terror budget preferences (for the DHS), blame judgments, severity judgments, and emotion ratings were significantly and highly intercorrelated (*r*'s: .79–.94; see Table 3). The ranked number of casualties was also significant and highly correlated with those measures (*r*'s > .80). Correlations between perceived likelihoods and every other judgment, however, were smaller in magnitude and not significant.

One potential reason for why we failed to find a significant effect of likelihoods in our analyses is that likelihood judgments could have been restricted in range (e.g., participants thought that these events were extremely unlikely).[7] Because all judgments were made on a seven-point scale, we could compare variances across conditions. A restriction of range does not appear to be a problem as variances ranged from a low of .26 for emotion ratings to a high of .63 for likelihoods; the next highest variance was judged severity (.54). Another potential reason is the scales could have been unreliable. However, a reliability analysis for each set of respondent's judgments revealed Cronbach's alphas that were high and statistically significant for all scales (α's range from .87 to .95).

Normative considerations suggest that it is not likelihoods per se that should matter in anti-terror preferences or blame judgments. Rather, one should take into account likelihoods and outcomes together, as well as their interaction (i.e., weighting outcomes by likelihoods). To test this account of the data, we first regressed budget judgments on likelihoods and the composite of severity and emotions judgments (given their high correlation; $\alpha = .91$). The analysis revealed a significant main effect of the outcome composite ($\beta_{composite} = .99$; $\eta^2 = .85$) but not likelihood ($\beta_{likelihood} = .03$; $\eta^2 = .01$). The model remains significant when the interaction term is added to the model. Although the individual predictors are no longer statistically significant – likely because of the small number of observations (12) relative to predictors (3) – outcomes continue to be a strong predictor of budget judgments ($\beta_{composite} = .79$; $\eta^2 = .85$). Likelihood ($\beta_{likelihood} = -.23$; $\eta^2 = .01$) and the interaction term ($\beta_{interaction} = .05$; $\eta^2 = .01$) are not strong predictors. Regressing blame judgments on the same predictors reveals nearly the same pattern of results (two predictors: $\beta_{composite} = .98$; $\eta^2 = .80$; $\beta_{likelihood} = -.02$; $\eta^2 = .00$; three predictors: $\beta_{composite} = 1.04$; $\eta^2 = .17$; $\beta_{likelihood} = .04$; $\eta^2 = .00$; $\beta_{composite} = -.02$; $\eta^2 = .00$) Results, moreover, do not differ qualitatively when we repeat the analyses substituting judged severity, emotional reactions, or ranked casualties for the outcome composite.

Finally, when any of the outcome-related variables (severity, emotions, or casualties) is controlled for in a partial correlation analysis examining the relationship between budget and blame judgments, the relationship drops from significant ($r = .79$) to non-significant levels (*r*'s < .36), which suggests that outcomes mediate the relationship between blame and budget judgments. In contrast, controlling for likelihoods does not change the relationship between budget and blame (*r*'s > .75).

In sum, Study 3 provides further evidence that people treat likelihoods as largely distinct from the blameworthiness of terrorist attacks and other outcome-related variables, including emotional reactions. Moreover, these outcome-related variables and not likelihoods are strongly related to respondents' anti-terror budget preferences.

Table 3
Correlations between mean judgments of budget priorities (budget), blameworthiness (blame), severity judgments (severity), negative emotional reactions (emotion), ranked number of casualties (casualties), and perceived likelihoods (likelihood) for twelve terrorist attacks presented in Study 3.

	Budget	Blame	Severity	Emotion	Casualties	Likelihood
Budget	–	.79*	.94*	81*	.84*	−.41
Blame		–	.91*	.91*	.80*	−.38
Severity			–	.90*	.82*	−.41
Emotion				–	.84*	−.43
Casualties						−.46
Likelihood						–

Note: Higher numbers for ranked casualties are associated with more casualties, and higher numbers for likelihood judgments are associated with the event being judged more likely. Thus, the negative signs in the far right column indicate that higher likelihood attacks are associated with lower budget priorities, less blame, less severe attacks, less emotion, and fewer casualties.
* $p < .05$.

Study 4

In Study 3, we found a strong effect of outcome-related variables and a relative lack of influence of likelihood judgments on budget and blame judgments. Next, we examine if people can be encouraged to take into account likelihood information in their judgments about terrorist attacks. We again asked people to make various judgments about terrorist attacks, but we expect that people making budgetary judgments will incorporate likelihoods into their judgments when that information is salient (as might be expected from a normative treatment of risk). However, consistent with outcome biases, we expect that people making blame judgments (and emotion and severity judgments) will not be influenced by likelihoods, whether or not the likelihoods of attack are salient.

We also examine a potential alternative explanation for our effects – beliefs about how easy it would be to stop an attack. One possibility that could influence our effects thus far is that the public could be attending to a consideration not yet explored – the ease with which the government could stop terrorist attacks. That is, if the public believes that the government should make a priority the terrorist attacks that are easiest to stop, then the public will cast blame when the government fails to stop the threats that are seemingly easiest to prevent – such as terrorist threats present to air traffic.

[6] Analyses do not differ qualitatively if injuries are also included in the coding.
[7] We thank Uri Simonsohn for raising this point.

Method

Participants

One-hundred and eighty adults (53% women; age ranged from 18 to 78; mean age was 49) from an online survey panel participated in the survey.

Procedures

The questionnaire was administered as part of an online session involving numerous unrelated questionnaires. The study used a 12 (type of attack; within-subjects) × 5 (judgment: blame, budget, severity, emotion, ease; between-subjects) × 2 (likelihoods: presented or not; between-subjects) mixed design ($n \sim 18$ per between-subjects condition).

Participants were shown the twelve potential terrorist attacks from Study 3 in a random order. As in Study 3 participants were randomly assigned to one of five judgment conditions: blame, budget priority, severity, emotional reaction, or ease of prevention. Judgments were made on a seven-point scale whose end points corresponded to the question being asked: (1) how much the Department of Homeland Security should make preventing each of the acts a budget priority ("Very low" and "Very high"; *Budget*), (2) how much blame is placed on the government for failing to prevent the acts ("not at all" and "very much"; *Blame*), (3) how severe the consequences of the attack would be ("not at all" and "extremely"; *Severity*), (4) how upsetting the terrorist attack would be ("slightly upset" and "emotionally devastated"; *Emotion*), and (5) how easy it would be for the Department of Homeland Security to prevent the act ("not at all" and "extremely easy"; *Ease*). Before making their judgments, participants who were randomly assigned to the likelihood information condition, were also told that after each scenario they would see the ranking of the relative likelihood that the event would occur in the next three years, from 1 = "most likely" to 12 = "least likely," as ranked by a group of anti-terror risk experts (*Likelihood*). Likelihoods were actually based on mean judgments of the same population ($N = 20$).

Results and discussion

We began by examining the relationship between judgments of ease and other judgments. The terrorist attacks served as the unit of analysis and were analyzed with regard to each other and the ranked likelihood information. There were no outliers or influential data points in the data. Blame, budget, severity, and emotion judgments were highly related to each other (r's: .56–.90) but again not related to likelihood ranks (see Table 4A). Judgments of ease of stopping terrorist attacks also did not significantly correlate with any of the other judgments or likelihood ranks. We again analyzed the variances and reliabilities of the measures. With one exception variances were above .24, and all judgments had high inter-rater reliability (α's > .78). The variance of ease judgments was .09. Mean ease judgments for the twelve events ranged between 3.4 and 4.4, which indicated to us that the events as a whole were neither judged easy nor difficult to stop.

The focus of the study was to analyze the effect of providing explicit likelihood information on the judgments of budget, blame, ease, and outcome. We use the correlations of likelihood ranks with the judgments of participants who did not see the likelihood information (far right column in Table 4A) as a baseline relative to which to compare the effect of explicit, salient likelihood information on judgments (far right column in Table 4B). When such information was provided, the correlation of budget judgments with likelihood information substantially increased (from $r = .03$ to $r = -.67$; $z = 1.7$; $p < .05$ one-tailed). That is, in the presence of explicit likelihood information, potential attacks that were ranked as more risky were judged to be a higher budget priority. In contrast to budget judgments, prior likelihood information did not have a statistical effect on any of the other judgments.

Table 4
Correlations between mean judgments of budget priorities (budget), blameworthiness (blame), severity judgments (severity), negative emotional reactions (emotion), ease of prevention judgments (ease), and likelihood ranks (likelihood) for twelve terrorist attacks presented in Study 4. The top correlation matrix is for judgments made with likelihood ranks absent, and the bottom correlation matrix is for judgments made with likelihood ranks present. The far right columns show the differential effects of providing likelihood information or not.

	Budget	Blame	Severity	Emotion	Ease	Likelihood
(A) Likelihood ranks absent						
Budget	–	.90*	.75*	.71*	.09	.03
Blame		–	.56*	.74*	.18	.00
Severity			–	.63*	.08	.45
Emotion				–	.09	.28
Ease					–	−.02
Likelihood						–
(B) Likelihood ranks present						
Budget	–	.49	.55	.41	−.28	−.67*
Blame		–	.57*	.65*	.12	−.03
Severity			–	.83*	−.39	−.07
Emotion				–	.09	.07
Ease					–	.26
Likelihood					–	

Note: Higher numbers for likelihood ranks were associated with the event being less likely. Thus, the negative signs in the far right column indicate that higher likelihood attacks would be associated with greater budget priorities, more blame, more severe attacks, greater ease, and more emotions.
* $p < .05$.

We also examined whether presenting likelihood judgments had an effect on budget but not blame judgments at an individual level analysis. We did so by calculating a correlation between the ranked likelihoods and each participant's blame or budget judgments. To conduct statistical tests, we transformed these correlations into Fisher z-scores. Again, as a baseline, we used the correlations between budget and blame judgments of participants who did not see the likelihood information and the likelihood ranks used in the study. In both cases, the mean correlations were non-significant ($r = .01$ and $r = -.05$, respectively). However, when respondents were presented the likelihoods, the mean correlation increased for budget judgments ($r = -.29$; $t = 2.0$; $p < .06$), but not blame judgments ($r = .00$; Interaction, $F(1, 68) = 3.83$; $p < .06$).

Consistent with a robust outcome bias, we were unable to persuade respondents to increase the reliance on likelihood information when judging how much they would blame the government for failing to prevent terrorist attacks (or influence any other outcome-related judgment). However, it is not the case that likelihood information is always ignored. When likelihood information was presented, respondents incorporated that information into their anti-terror budget allocations.

General discussion

The tendency for the public to deviate from rational or normative consideration is well documented (Caplan, 2007; Kahneman, Slovic, & Tversky, 1982). We contend that the public's risk preferences for potential terrorist attacks also deviate from normative considerations by failing to consider the likelihood of attack (Sunstein, 2003). Our studies highlight a potential dilemma that anti-terror policy makers face. Although the public believes that anti-terror policy should emphasize likelihoods of attack, their judgments of anti-terror budget priorities before a terrorist attack and their blame judgments after an attack are largely uninfluenced by their perceived likelihoods of attack. Instead, the public seems most focused on issues pertinent to the outcome of the attack (e.g., its severity or how upsetting it is). The pattern persists among

experts: anti-terror policy preferences of decision analysts are well predicted by considerations of blame but not by perceived likelihoods. Because policy makers are accountable to public opinion, they may be tempted to ignore likelihood information and try to prevent terrorist attacks that the public would find most blameworthy. That is, they would prevent attacks that are more severe and more upsetting without sufficiently balancing the attack's likelihood against its outcome. Moreover, we show that a potential solution to the dilemma – highlighting likelihoods of attack to the pubic – can effectively influence people's anti-terror budget priorities before an attack, but because of outcome biases, highlighting likelihoods has no influence on blame judgments, severity judgments, or how upsetting an attack is once it has occurred.

Accountability of policy makers

The Department of Homeland Security (DHS) faces a high degree of accountability; 108 Congressional committees and subcommittees oversee the Department (National Public Radio, 2010). Moreover, politicians, including Mayor Michael Bloomberg, suggest that a purely normative approach is not the only input to the DHS's anti-terror policy decisions. For instance, political leaders in New York bitterly complained that the DHS failed to provide grant money that was commensurate with the terror risks facing New York City, as the city has been targeted before and will likely be targeted again (Hernandez, 2004). Politicians were especially upset about a government allocation policy in which cities such as Louisville, KY and Fresno, CA are able to apply for "high-threat" grant money because the cities do not face significant threats of terrorism (Chen, 2007).

We suspect that policy and spending related to anti-terror security measures could be motivated by the anticipated reactions and preferences of the public. Although another 9/11 style attack is highly unlikely (Mueller, 2006), Study 1 suggests that the public's reactions to another attack would be at best politically uncomfortable. This may explain why the US government focuses substantial resources on reducing terrorist threats to the airline industry.

When constituents' reactions to the outcomes of decisions are predictable, one desirable strategy is to conduct a thorough analysis of options and future-oriented rationality in order to minimize negative outcomes and resulting negative evaluations (Tetlock, 1992). Another response to accountability is to strategically shift attitudes and behavior to please the public (Adelberg & Batson, 1978; Tetlock, Skitka, & Boettger, 1989). The latter strategy is more common when the outcomes of the decision rather than the decision process are the basis for the evaluation (Simonson & Staw, 1992), as the results of our studies suggest. In the context of terrorism prevention, strategic shifts toward the public's preference can have the undesirable effect of making the public less safe because attacks that are less likely but more blameworthy could receive greater resources.

If we are correct, policy makers face a delicate balancing act between keeping the public safe and keeping the public happy. As we have discussed, policy makers could maintain a normative risk focus and educate the public about the prior likelihoods of attack in the face of backlash for anti-terror failures. However, Study 4 reveals a weakness with that solution. Although people can be persuaded to use likelihood information for anti-terror budget priorities, people cannot be similarly persuaded to take into account prior likelihoods when judging blame in light of terrorist acts that have occurred. Thus, policy makers appear to be stuck between a rock and hard place. In order to minimize risk to the public, the policy maker must risk angering the public in order to keep them safe. The policy maker who uses normative methods to stop harm from happening is rarely recognized for successful preventive measures (Taleb, 2007). Only when some unfortunate event happens is the policy maker scrutinized for decisions that were made in the best interests of the public, but nonetheless made prior to a successful attack. Taking these issues into account, the government could consider novel solutions to the dilemma. For example, the government could make appointments to the DHS similar to that of judges with lifelong or fixed appointments, so that policy makers can serve without risk of political pressure.

Limitations, alternative explanations, and future directions

We raise the concern that policy makers face multiple influences when designing anti-terror policy, one being the blame they expect to face from the public. A limitation of our inquiry is that we do not survey policy makers or analyze their actual anti-terror decisions. Given the well-developed literature that documents how accountability of the public can influence policy makers, we believe it is reasonable to point out the dilemma created by considerations of blame. Moreover, the anecdotal evidence that we present suggests that anti-terror decisions are being influenced by more than normative considerations.

We show that our expert sample of decision analysts act similarly to our non-expert sample, exhibiting probability neglect in budgetary judgments, which are in turn well-predicted by blame. This result does not necessarily lead to the conclusion that government policy makers will act as the public or our sample of decision analysts does (Rachlinski, 2000). After all, even if policy makers are inclined to rely on their feelings, they have normative techniques of risk analysis at their disposal to avoid undue effects of their own emotional processes. Thus, the finding we present is important because it highlights the need for likelihood information to be explicitly considered in the design of policy.

The design of our studies may limit some of the conclusions that we can draw from our empirical evidence. For instance, our reliance on comparisons of correlations may limit the strength of the conclusions that we can draw about the direction of effects. For instance, do our judges' emotional reactions lead to perceptions of severity or vice versa? Regardless of our inability to be certain of the mediating role of emotions between blame and budget judgments, for instance, we find that a host of outcome-related variables (perceived severity, emotions, casualties, etc.) are highly related to each other and consistently unrelated to likelihoods.

In our studies, we also limited the measurement of emotional reactions to how upset respondents would be about potential terrorist acts, and perhaps we would have been better served asking for open-ended responses to understand the natural reactions of our respondents. For instance, it is not clear the degree to which our question tapped into specific emotions of sadness and anger. Small, Lerner, and Fischhoff (2006) examined attributions of the public about the causes of the 9/11 terrorist attacks. Causal attributions of terrorist or government actions were greater for people angry about the attacks than for those people saddened by the attacks. While we ascribe the neglect of probability in our studies to people's reliance on their emotions, we do not know the degree to which this effect is due to specific emotions like fear, sadness, or anger. While we suspect that blame judgments were due to anger, which would be consistent with Small et al. (2006), we leave this question to future research.

The hypothetical nature of our studies, which for example do not involve real terrorist attacks, may limit the conclusions we can draw about specific processes. As opposed to classic studies on hindsight processes (Fischhoff, 1975), we do not ask for judgments before and after real events. Rather, we ask our respondents to engage in hypothetical time travel (i.e., imagining that an event has or has not happened). The effect shown in Study 4, where the presentation of likelihoods influences budget judgments but not outcome-related variables, assuages some of this concern, however. We find

that likelihood information affects budget judgments, which are framed as occurring before an attack, but not for other judgments, which are framed as occurring after an attack, in ways that are consistent with outcome and hindsight biases.

Finally, although we tested the alternative explanation that our effects can be accounted for by considerations of efficacy or ease of stopping various attacks, we cannot rule out that influence because we measure rather than manipulate that variable. Moreover, our respondents' considerations of blame and budget could be more complicated than we characterize and test. For instance, considerations of blame although highly related to judged severity and casualties in our studies could be further influenced by specific attributions about the government's role in the failure to stop the attack. One set of attributions could be about whether the government sufficiently invested in stopping the attack or whether the investment was sufficient but the budget was incompetently executed. Each of these issues is worthy of further study.

Conclusion

We document people's tendency to ignore information about the likelihood of terrorist attacks when assessing blame on policy makers. Moreover, even if the policy makers are able to cite the likelihoods of attack in order to satisfy the public regarding anti-terror allocations, once an attack happens, the use of a priori risk information will cease to be an effective justification. Thus, the psychological nature of people's perceptions and processing of risk information may have a perverse policy effect on their safety. The public's tendency to evaluate anti-terror activities on the outcome and not on the quality of policy makers' decisions creates incentives for policy makers to deviate from a purely risk-based approach. Given this behavior, we urge a dialogue with policy makers that enables them to explore ways in which they can effectively make decisions that are not in their best interests but in the best interests of their constituents.

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Appendix 1. List of 20 potential terrorist attacks used to select stimuli in Study 1

A dirty bomb is detonated and releases toxic agents in the air.

The water supply in a community is contaminated with toxic agents.

A biological agent (e.g., anthrax) is released on a community from a crop duster.

Biological agents (e.g., anthrax) are disseminated through the mail.

A commercial jet is hijacked.

A commercial jet is flown into a civilian object.

A bomb is smuggled and detonated on a commercial jet.

Terrorists take control of a nuclear power plant.

A bomb is smuggled and detonated on a passenger train.

A cruise ship is hijacked.

A bomb is smuggled and detonated on a cruise ship.

A suicide bomb is detonated in a public place.

A truck bomb is detonated in a public place.

A rocket launcher is used to attack a public place.

A city's electric power distribution is attacked and destroyed.

A cyber attack is conducted on private or public sector computer networks (e.g., financial service, utility industry control systems).

A shoulder-fired missile is used to shoot down an airliner.

A chemical plant is sabotaged, releasing a cloud of poisonous gas.

A small nuclear device is smuggled into the country and detonated in a major metropolitan area.

A major food source (crop or livestock) is attacked with a biological agent.

Appendix 2. List of 14 potential terrorist attacks used in Study 2

A dirty bomb is detonated and releases toxic agents in the air.

The water supply in a community is contaminated with toxic agents.

A biological agent (e.g., anthrax) is released on a community from a crop duster.

Biological agents (e.g., anthrax) are disseminated through the mail.

A commercial jet is hijacked.

A commercial jet is flown into a civilian object.

A bomb is smuggled and detonated on a commercial jet.

Terrorists take control of a nuclear power plant.

A bomb is smuggled and detonated on a passenger train.

A cruise ship is hijacked.

A bomb is smuggled and detonated on a cruise ship.

A suicide bomb is detonated in a public place.

A truck bomb is detonated in a public place.

A rocket launcher is used to attack a public place.

Appendix 3. List of 12 potential terrorist attacks used in Study 3 and 4

Terrorists release foot and mouth disease into large livestock operations. The disease would result in a huge loss of livestock resulting in hundreds of millions of dollars lost and would require months to recover.

Terrorists detonate a 10-Kiloton Improvised Nuclear Device in a large metropolitan area. The detonation would result in: widespread casualties from blast and fallout; 450,000 + people displaced; contamination over 3000 square miles; hundreds of billions of dollars lost and years to recover.

Terrorists deliver aerosol anthrax in a metropolitan area with a large commuter workforce. Such an attack would result in 13,000 + casualties with extensive subsequent contamination; billions of dollars are lost and recovery takes months.

Terrorists release pneumonic plague into main areas of a major metropolitan city. The plague would result in 2500 fatalities and 7000 injuries with an economic loss of millions and require weeks for recovery.

Terrorists use a light aircraft to spray chemical agent Yellow into a football stadium or like large, dense, public gathering. The agent would be expected to cause 150 fatalities and 70,000 hospitalizations, causing an economic loss of $500 million and possible long-term health affects for people exposed.

Terrorists bomb refineries and chemical production plants causing a release of toxic clouds. The release is expected to result in 350 fatalities and 1000 hospitalizations; up to 700,000 people evacuated and economic losses of billions with months required for recovery.

Terrorists release nerve gas into ventilation systems in large office buildings. The gas would result in 6000 fatalities and 350 injuries with an economic impact of $300 million and recovery taking 3–4 months.

Terrorists bomb an industrial facility that stores large quantities of chlorine gas. The release of gas would result in 17,500 fatalities, 10,000 severe injuries, 100,000 hospitalizations resulting in millions of dollars of economic loss and requiring weeks for recovery.

Terrorists detonate a radioactive "dirty-bomb" in three metro areas. The detonation would cause: 180 fatalities, 720 injuries and 20,000 contaminations, contamination of 108 city blocks costing billions of dollars and requiring months to years to recover.

Terrorists bomb multiple public sites using improvised explosive devices. The bombings would cause 100 fatalities and 450 hospitalizations resulting in a localized economic impact requiring weeks to months to recover.

Terrorists infect food with anthrax via production plants. The infected food would cause 300 fatalities and 400 hospitalizations, result in millions of dollars economic loss and require weeks to recover.

Terrorists attack computer networks in the nation's financial infrastructure. The attack would cause network damage and cause millions of dollars of economic loss and require weeks to recover.

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