The Illusory Nuclear Taboo

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Abstract

Influential research finds historical evidence of a widespread and categorical taboo against nuclear weapons, while more recent survey experimental work finds the public to be surprisingly responsive to variation in the costs or benefits of nuclear use. How can we reconcile evidence of taboo with evidence of cost-benefit analysis in survey experiments? We argue that under reasonable conditions, simple rational choice can produce the *illusion of taboo*: consistent opposition rooted in the intrinsic destructiveness of nuclear weapons that nonetheless lacks the truly categorical aversion of a taboo. Using a series of experiments that independently vary more strike features than prior work, we find that when nuclear weapons remain linked to their typical negative side-effects, the public is both less supportive of nuclear strikes *and* less persuaded by their military advantages. Our account builds a bridge between the wide range of results observed in survey experiments and archival evidence suggesting that policymakers felt constrained as if by a taboo.

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What role do public attitudes play in sustaining nuclear non-use? Prominent observational research sees public opinion as imposing an unthinking and categorical "taboo" against the use of nuclear weapons (Tannenwald 1999, 2005, 2007). However, survey experiments find that subjects are sensitive to the costs and benefits of nuclear use, with opposition being situational rather than categorical. When nuclear weapons are presented as offering substantial military advantages, majorities can be persuaded to endorse a nuclear strike over less effective conventional alternatives (Press et al. 2013; Sagan and Valentino 2017; Haworth et al. 2019). Meanwhile, studies that present nuclear use as carrying considerable costs—that present nuclear strikes as breaking international law (Carpenter and Montgomery 2020) or precedent (Post and Sechser n.d.), or causing particularly horrific collateral damage (Koch and Wells 2020)—find more muted support.

What should one make we make of the apparent contradiction between archival evidence suggesting a strong taboo and the wide range of public resistance observed in survey experiments? In this paper, we show that simple cost-benefit analysis can produce the *illusion of taboo* in the regions of the public's nuclear preference profile most likely to be observed in the real world.

This illusion of taboo pattern is characterized by two features of choice that can create observational equivalence with a nuclear taboo. First, the perceived negative consequences of nuclear weapons reduce support for nuclear strikes. Second, perceived negative consequences also reduce the persuasive effect of military advantages. If nuclear weapons cause little more collateral damage than conventional alternatives, the effect of military utility can be large and easily swing majority opinion in favor of nuclear use. But when a nuclear option is heavily disadvantaged at baseline by its expected collateral damage, the marginal military advantage will have a much smaller effect. Provided that nuclear weapons remain linked to these negative side-effects, the public will reliably prefer conventional alternatives to even militarily advantageous nuclear options.

Though we are not the first to observe that perceptions of negative consequences reduce

support (Carpenter and Montgomery 2020; Koch and Wells 2020; Post and Sechser n.d.), our insight that the negative consequences of nuclear strikes also reduce the persuasive effect of their potential advantages squares historical accounts of a seemingly categorical taboo with survey experimental findings. The twin effects of the negative consequences of nuclear weapons on aggregate opinion—low support *and* low persuadability—can explain the full range of results in existing survey experiments and offers a new interpretation of observational evidence of a nuclear taboo. Prior survey experimental work has convincingly showed that public attitudes toward nuclear weapons do not rise to the level of a truly "unthinking" or categorical taboo and instead exhibit the influence of rational choice (Press et al. 2013; Sagan and Valentino 2017). We build on these findings by demonstrating that a rational choice framework also predicts a rigid, inflexible opposition that one could mistake for a taboo.

We demonstrate the ability of nuclear weapons' disadvantages to create an illusory taboo using a series of survey experiments. In an innovation for the nuclear attitudes literature, we independently randomize both the military advantages *and* the undesirable side effects of nuclear strikes within conjoint and 2×2 factorial vignette designs. While existing studies show that military utility and negative side effects matter individually, this approach allows us to study how they interact to produce preferences. We first analyze three conjoint (or choice) experiments that ask subjects to select one of two strike options to destroy a perilous terrorist threat. These experiments vary weapon type (conventional or nuclear), two military utility variables (probability of a successful mission and U.S. military casualties), and three surrounding or side-effect variables (civilian casualties, physical and environmental destruction, and the level of support for the strike among allies). We find that preferences between nuclear and conventional strike options follow our predicted pattern of non-constant treatment effects: the effect of a marginal military advantage on preference for a nuclear strike is conditional on that strike's disadvantages. When nuclear options are disadvantaged on the expected dimensions of choice, such as civilian casualties and environ-

mental destruction, the effect of adding one military advantage is both smaller than when nuclear options are similar to conventional alternatives and insufficient to generate majority preference for nuclear use.

The second portion of our empirical analysis revisits the seminal Press et al. (2013) design. We examine novel and extant vignette experiments replicating or modestly adapting Press and colleagues' original set-up. Collectively, these experiments provide independent variation in both the military advantages of nuclear weapons and their most notable, and perhaps typical, disadvantages: civilian casualties, long-lasting environmental damage, and international opprobrium. Consistent with our illusion of taboo framework, we find that baseline support *and* the marginal effect of adding a military advantage decline when these negative side-effects are present, with nuclear use again failing to achieve majority support.

If the taboo is illusory, does public opinion have the potential to check policymakers tempted to use the bomb? Though opposition to nuclear use lacks the categorical opposition of a true taboo, a leader who focuses on the tactical benefits to using nuclear weapons could face public resistance if nuclear use causes, as would often be the case, wanton destruction and international condemnation. In effect, we offer an optimistic view of the unfortunate reality that the public can, in extreme circumstances, be persuaded to endorse nuclear strikes.

Our paper makes important contributions to the literature on nuclear attitudes. First, it provides a general and parsimonious framework for understanding how the balance and interaction of strike features produce preferences over nuclear use. Indeed, every previously published account of the public's willingness to endorse nuclear strikes is consistent with an illusory taboo rooted in a utility calculus based on strike features. Moreover, our use of choice experiments provides a more fine-grained look at public attitudes toward nuclear weapons than has been possible with traditional vignette approaches.

Second, we offer a clear explanation for the empirical gulf that has emerged between the taboo literature and more recent survey-based studies on nuclear attitudes. Taboos are characterized by categorical opposition. As Tannenwald (2007, 62) writes, the prohibition is

"absolute." Yet prior work showing alarmingly high support for nuclear use not only indicates that opposition is far from categorical, it raises the question as to how policymakers and observers could have *perceived* a taboo where none existed. We present a solution to this puzzle, arguing that while subjects think about nuclear use much like any other choice—weighing the costs and benefits—nuclear weapons have come to be so thoroughly defined by their negative side effects that normal rational choice might, in the real world, produce consistent if not truly categorical opposition. The illusory taboo takes its name from this possibility.

Taboo or Something Else?

The non-use of nuclear weapons since 1945 is a defining feature of the nuclear age (Sagan 2004; Tannenwald 2007; Paul 2009; Walker 2010; Gavin 2015; Smetana 2019). It is expected that states would not use nuclear weapons in the same manner as "you would use a bullet or anything else," to quote President Dwight Eisenhower (Chang and Di 1993, 1519). Despite agreement on the importance of non-use, the source and nature of this pattern of behavior remain central questions in the literature. The disagreements are rooted in Cold War discourse about the "conventionalization" of nuclear weapons.[1] Is the use of nuclear weapons different from the use of a conventional weapon? If so, what makes their use different? There are two prominent answers to these questions: the nuclear taboo and the tradition of non-use.

Tannenwald (1999) argues that nuclear non-use is the product of a taboo on nuclear weapons. Critical to this conception of a taboo is that regardless of how it arose, it functions as a categorical prohibition. This means that "any use of nuclear weapons is prohibited. That is, the normative prohibition has come to be an absolute one: the weapons themselves are proscribed" (Tannenwald 2007, 62). A taboo has a quality of "absoluteness, unthinkingness, and taken-for-grantedness" (Tannenwald 1999, 436).

[1] Jervis (1989) provides an excellent overview of this concept.

The tradition theory, as articulated by T.V. Paul and others, points out out that since the use of nuclear weapons is subject to frequent debate, opposition to their use cannot be unthinking (Paul 2009, 2010). If nuclear use is subject to rational discourse among elites, then nuclear restraint must be a product of the tradeoffs faced by rational actors. Therefore, the norm of non-use is better described as a tradition rather than a taboo. One factor that sustains this tradition is the moral and material implications of the civilian casualties and environmental devastation that are caused by nuclear use (Paul 2009; Quester 2006). These normatively bad outcomes produce a backlash among the elites in other countries, damaging the state's reputation. Another factor in the tradition is reciprocity. Policymakers forego nuclear use for fear of setting a precedent under which they could become victims of a nuclear attack in the future (Sagan 2004). Due to these downsides, leaders are "self-deterred" from using nuclear weapons (Paul 2010, 861).

The major theories in the non-use debate disagree on the public's role in sustaining nuclear restraint. Tannenwald's account describes a consistent, visceral public opposition that constrains policymakers, leading, for example, President Eisenhower and Secretary of State John Foster Dulles to lament the "tabu which surrounds the use of atomic weapons" (Tannenwald 1999, 449). The tradition, by contrast, describes aversion to nuclear use as an elite-level phenomenon rooted in strategic calculation, assigning domestic publics a relatively small role in producing the record of non-use.

These disagreements led to a series of experiments designed to test the taboo and tradition accounts. This turn towards experiments has been criticized for setting aside the question of whether the public matters at all for producing a pattern of non-use. We find this charge to be misguided because experiments speak to this "first-order question" by establishing whether the public *could* matter in producing a pattern of non-use. If the public does not oppose nuclear use, then non-use would have to be explained only with reference to elites. If, however, there is a clear preference pattern on the part of the public against nuclear weapons, then the public may play a role in constraining policymakers from

making decisions to use the bomb. Furthermore, experiments are an attractive method for testing attitudes toward nuclear use because they allow researchers hold equal or vary several features of nuclear and conventional strikes. Yet this advantage of survey experiments poses the question to researchers of what makes sense to hold equal and what scenarios best reflect the setting of theoretical interest.

In a pioneering experiment "designed to vary the relative military utility of nuclear weapons," Press et al. (2013, 197) find that when presented with a scenario about a hidden Al Qaeda nuclear lab, a large majority of respondents preferred a conventional strike over an equally effective nuclear strike that would cause no more civilian deaths. Yet when the nuclear strike offered greater military effectiveness—but still caused no more civilian deaths than a conventional alternative—a majority preferred the nuclear option. This led Press, Sagan, and Valentino to conclude that aversion did not rise to the level of a taboo and that "support for nuclear strikes rises steadily as a function of their perceived military utility" (Press et al. 2013, 189). Public opinion would not meaningfully constrain policymakers' use of nuclear weapons if a nuclear strike brought a greater chance of military success.

Though the Press et al. (2013) approach casts serious doubt on the taboo, one concern is that the core prospective experimental conditions of the study, which showed the largest treatment effects, held equal the collateral damage caused by nuclear and conventional weapons either explicitly (for civilian casualties) or implicitly by omitting discussion of environmental side effects and the like.[2] While the Press et al. (2013) study did not describe the side effects of a nuclear strike as trivial, by setting its material consequences equal to that of a conventional strike it nonetheless removed a key disadvantage that many people associated with nuclear weapons.

Indeed, subsequent studies by Sagan, Valentino, and colleagues appear to reflect the sense that this design feature may have denuded nuclear weapons of their essential destruc-

[2]As we record in Table 1 below, Press et al. (2013) have in the appendix an experimental condition in which nuclear weapons cause greater civilian death than conventional alternatives. However, civilian death is not independently varied and the results do not appear to have been central to the paper's argument.

tiveness and sought to test attitudes towards nuclear weapons when they cause higher levels of destruction relative to conventional alternatives. Sagan and Valentino (2017) vary whether a nuclear strike kills 2 million civilians or 100,000. While increasing civilian deaths decreases support for a strike on an Iranian city as opposed to a ground invasion of Iran, the nuclear strike still receives close to 50 percent support. Haworth et al. (2019) ask respondents about a hypothetical nuclear strike on North Korea and find that the strike which kills 1 million North Korean civilians receives about as much support as the strike that kills 15,000 civilians, though both strikes garner only 33 percent support.

Other studies that vary the consequences of nuclear use find that the public is not as permissive as Sagan, Valentino, and colleagues find in their experiments. Koch and Wells (2020) show that support for nuclear use drops when subjects learn more about the particularly horrific collateral damage and civilian harm caused by nuclear weapons. Post and Sechser (n.d.) find that public resistance to nuclear use is stronger when subjects are shown experimental vignettes that include elite cues about the danger of breaking the 70+ year precedent of non-use. Carpenter and Montgomery (2020) find that prompting subjects to consider legal and ethical obligations to limit civilian casualties decreases support for nuclear use. Finally, Rathbun and Stein (2020) find that moral concerns, not just strategic calculus, play a role in subjects' preferences between nuclear and conventional strikes.

Taken together, the survey experimental literature shows that while the ethical and strategic costs of nuclear weapons can dampen public support for militarily beneficial nuclear strikes, there is no bright-line taboo at the individual level. Indeed, there are some scenarios in which nuclear use would produce horrific side effects but nonetheless garner alarmingly high levels of public support. The state of the literature leaves open fundamental questions. How could observers see a taboo in public attitudes where none exists? And even if the taboo is illusory, could public attitudes still act as a consistent check on policymakers tempted to use the bomb?

Illusion of Taboo?

To better understand the disconnect between the taboo theory and experimental findings, we revisit the logic of taboos. Taboos are characterized by categorical opposition to an action; taboos are not amenable to cost-benefit analysis and even to think in such terms is wrong (Fiske and Tetlock 1997). Breaking a taboo, or even the thought of breaking it, produces "gut" revulsion that overwhelms cost-benefit concerns. This is because taboos are followed due to a "ritual avoidance" that is not solely rooted in the rational calculation of the consequences of performing the taboo act (Radcliffe-Brown 1939). If a person does break a taboo, they feel ashamed or "unclean" and try to hide their activity from the rest of society (Radcliffe-Brown 1939).

Though the record of non-use since 1945 and some archival evidence comports with a taboo, survey experimental research and even Americans' enduring high approval for the Hiroshima and Nagasaki bombings strongly suggest that public attitudes toward nuclear weapons lack the wholly categorical opposition of a true taboo. Indeed, the wide range in experimental results that emerge from variation in the costs or benefits of nuclear use indicates that rational choice plays a large role in determining preferences.

How could an observer mistake the patterns of public preferences that would stem from rational cost-benefit analysis with the patterns that would result from a true taboo? Our key insight is that the negative consequences that have come to define nuclear weapons in the public's eyes should produce two patterns that *resemble* a taboo. First, as Koch and Wells (2020) have found, defining nuclear weapons as having more severe side effects should reduce support for them. Second, and thus far untested with factorial experiments, defining nuclear weapons as having more severe side effects should also reduce persuadability; when nuclear weapons are seen as carrying a lot of disadvantages, the *effect* of military advantages on support should be muted. In a world where nuclear weapons are consistently viewed as carrying substantial negative side effects, one should expect both low baseline support *and*

resistance to the persuasive effects of nuclear advantages. We label this the *illusion of taboo*: simple rational choice can produce consistent opposition to nuclear use in the scenarios most likely to be observed in the real world, i.e., in which nuclear weapons would have substantial negative side effects. It is in less likely-to-be-realized scenarios, where nuclear weapons are similar in destructiveness to conventional weapons, that the illusory taboo disappears and the public's cost-benefit calculation is reflected in increased support for nuclear use.

Though we are not the first to find that support for nuclear weapons may be weighed down by their disadvantages (Koch and Wells 2020; Carpenter and Montgomery 2020; Post and Sechser n.d.; Press et al. 2013; Sagan and Valentino 2017), the illusion of taboo framework pairs this observation with the novel insight that nuclear weapons' intrinsic downsides can also produce taboo-like resistance to persuasion. In doing so we help to reconcile experimental results with historical evidence that decision-makers may have felt constrained by inflexible, taboo-like attitudes. To develop an intuition for this logic, imagine that you are offered one of two cars, free of charge. One is brand new. The other is an older version of the same make and model, with many more miles, worse safety features, lower fuel efficiency, and out-of-date electronics. Faced with such a choice, few people would prefer the old car. Further, given the baseline disparity between the choices, few people would change their mind even if it turned out that the old car had a more powerful engine. Now imagine that the choice is between two otherwise identical cars. In this case, one would expect greater support at baseline for the otherwise-disadvantaged car. Adding a more powerful engine would function as a tie-breaker, causing a larger shift in preferences than before. In this way, eliminating the baseline difference between the two cars raises baseline support for the otherwise-disadvantaged car *and* increases the marginal effect of a more powerful engine.

Put more generally, our key insight is that in any decision, negative side effects undermine both baseline support *and* persuadability, leading to rigid opposition. This logic can be applied to a wide range of human decisions. When there are a lot of reasons *not* to do something, support will be low, and the marginal reason *to* do it will not be all that persuasive.

Even with the additional benefit, it remains a bad option. By contrast, when two options are very similar in their advantages and disadvantages at baseline, the marginal advantage can easily swing the outcome. In the appendix, we formalize this argument, showing that a standard discrete choice framework (e.g., Train 2003) predicts our key results.

The illusion of taboo framework can apply to the question of nuclear use. Consider first the choice between a nuclear strike and a conventional alternative where the nuclear option is disadvantaged on the expected dimensions: it will kill more civilians, cause greater environmental damage, and lead the U.S. to face international backlash. At baseline, we would not expect the nuclear option to be very popular. In this scenario, assigning the nuclear option a greater chance of destroying the target may have only a modest effect on choice. People care about military effectiveness, but the downsides of nuclear use limit support *and* persuadability. Consider next the choice between a nuclear strike and a conventional alternative where the two options are identical in their side-effects; holding all else equal, they are different in name only. Here, the nuclear option should be more popular at baseline (though not necessarily highly popular). Moreover, assigning the nuclear option a better chance of destroying the target should have a more substantial effect on strike preferences. When all else is equal, the marginal advantage can easily swing the outcome such that majorities could prefer nuclear use.

The expectation that the side effects of nuclear weapons will also weigh down the persuasive effect of military advantages highlights a blind spot in previous survey experiments. Though it has been shown that that willingness to endorse nuclear strikes is lower in scenarios where nuclear weapons remain tethered to the collateral damage for which they are known, no previously published study has independently varied both the potential advantages and disadvantages of nuclear strikes in a factorial design (Table 1). Consequently, though scholars have shown that both military utility and side effects matter on their own, existing research does not examine how they matter *in relation to one another*. If the adverse consequences of nuclear weapons lower both support for nuclear strikes *and* reduce persuadability in response

Table 1: Variation in advantages and disadvantages in existing research.

	Same side effects			Nuclear worse side effects			
Study	Equally effective	Nuclear more effective	Diff.	Equally effective	Nuclear more effective	Diff.	D-in-D
Tannenwald	Low	Low	Low	Low	Low	Small	Small
PSV 2013	18.9%	51.4%	32.5	-	39	-	-
SV 2017	-	55.6%	-	-	47.7%	-	-
RS 2020	15.5%	45.6%	30.1	-	-	-	-
KW 2020	-	22%	-	-	14%	-	-
CM forthcoming	-	54%	-	-	46%	-	-

Note: Table shows point estimates on subject preference for nuclear use when (1) nuclear weapons offer military advantages but have worse side effect, (2) when nuclear weapons offer military advantages and have similar side effects to a conventional alternative, (3) when nuclear weapons offer no military advantages and have worse side effects, and (4) when nuclear weapons have no military advantages and similar side effects to a conventional alternative. Tannenwald's implied predictions offered as a baseline for what we call strong nuclear taboo. PSV stands for Press et al. (2013), SV for Sagan and Valentino (2017), RS for Rathbun and Stein (2020), KW for Koch and Wells (2020), CM for Carpenter and Montgomery (2020). "D-in-D" stands for difference-in-differences. One study that we reference in the literature review but that is not listed here is (Haworth et al. 2019). This is because they do not present a choice to respondents between a conventional and a nuclear strike, only a choice of whether to strike or not, with one of the treatments being weapon type.

to military advantages, the utility calculus emphasized by the tradition theory (Paul 2009; Sagan 2004) and survey evidence (Press et al. 2013) is consistent with observed preferences that have the illusion of a taboo. Public opposition can be high and unyielding even if it originates in a utility calculus.

To fill this gap, we conducted a series of experiments that independently randomize both the military advantages and the negative side effects of nuclear weapons. Before we describe these designs, the next section crystallizes the illusion of taboo framework's empirical predictions.

Predictions

The illusory taboo account's key insight is that the effect of military advantages on support for nuclear strikes is conditional on the perceived side effects. Figure 1 illustrates how this prediction applies to a case in which a nuclear strike would offer a 20 percentage

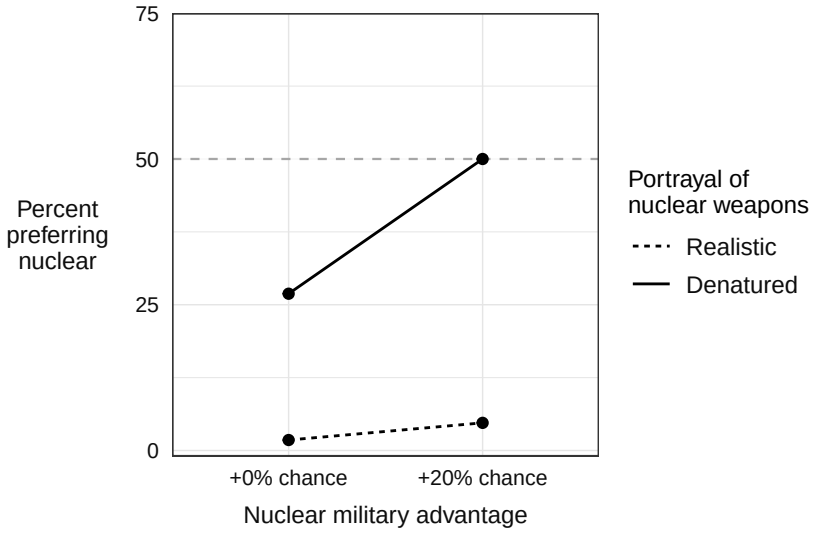
point increase in the chance of successfully destroying a target. These predictions are based on the discrete choice framework presented in the appendix.

The predictions highlight both central elements of the illusory taboo account: low baseline support and resistance to persuasion. The dashed line represents a realistic scenario in which nuclear weapons are tied to their usual disadvantages, such as greater civilian casualties, environmental destruction, and international condemnation.[3] In such a case, assigning the nuclear strike a military advantage such as increased probability of success does not change public opinion all that much. By contrast, the solid line represents a scenario in which nuclear weapons are "denatured," or stripped of the destructive characteristics that often accompany their use. In this scenario, adding a military advantage has a large effect on public support, perhaps even securing majority support for a nuclear strike. Consistently strong, almost taboo-like opposition to nuclear use occurs due to the reasonable expectation that nuclear strikes cause undesirable side effects above and beyond those caused by conventional alternatives.

To further illustrate the non-constant or conditional effects implied by our theoretical framework and their implications, we abstract away from specific advantages and disadvantages and instead predict preferences as a function of a strike's "net advantages" over the alternative across many potentially relevant strike variables. For example, a strike that would have a higher probability of success but would kill more civilians, cause more environmental damage, lead to more international condemnation, and save no more U.S. military lives than an alternative strike would have a net advantage score of -2 (1 - 1 - 1 - 1 + 0 = -2). A strike that has advantages over the alternative on all of these dimensions would have a net advantage score of 5, whereas a strike that is disadvantaged compared to an alternative on all of these dimensions would have a net advantage score of -5. A strike identical to the alternative would have a net advantage score of 0.

[3]We use the term "realistic" in Figure 1 and in other figures to mean the conditions more likely to be occur in the real world. It is not impossible for a nuclear strike to cause similar collateral damage to a conventional weapon, particularly if it is used in an empty or deserted area, but these circumstances are rare.

Figure 1: Predicted effect of military advantages conditional on the portrayal of nuclear weapons.



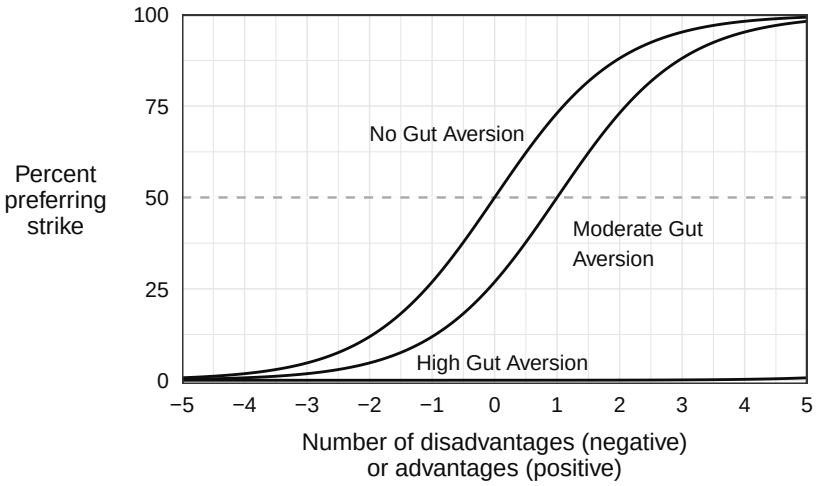
Note: This figure plots our predictions for support for a military strike (y-axis) as a function of its greater chance for tactical success based on the disadvantages ascribed to the nuclear strike. The predictions are derived from the discrete choice framework presented in Appendix C.

Figure 2 displays the discrete choice framework's predictions across all possible values of our net advantages summary variable. It compares predicted public support for a nuclear strike (y-axis) based on their net advantages (x-axis). The three separate lines represent three different levels of "gut" aversion to nuclear use. The bottom line represents gut aversion that is substantial enough to outweigh all other considerations, similar to Tannenwald's strong, taken-for-granted taboo. The middle line again compares nuclear and conventional strikes, this time reducing gut aversion to a more modest level, akin to Sagan's emphasis on habit. The top line represents the comparison between two conventional weapons by assuming that there is no gut aversion to either strike.[4] This serves as a benchmark for what a choice between nuclear and conventional weapons would look if it were no different from any other choice.

The key implication of Figure 2 is that when a strike is defined as having a lot of disadvantages, a high level of affective or gut aversion is not necessary to produce strong

[4]Note, for example, that subjects are predicted to be indifferent between the two identical strikes, i.e., when a strike's net advantage score is 0.

Figure 2: Model predictions under three levels of aversion.



Note: This figure plots our predictions of preference for a military strike (y-axis) as a function of its relative advantages or disadvantages over a competing option (x-axis). The point estimates for each value of net advantage are derived from the model parameters in Appendix C.

opposition to nuclear use. This is visible in all three lines on the left-hand side of the x-axis in Figure 2. When nuclear strikes carry a lot of disadvantages, support for them is low and unresponsive to the addition of a marginal advantage regardless of the level of gut or inherent aversion to a strike. This suggests that if nuclear weapons almost always carry several negative side effects or disadvantages at baseline, then there can be near-observational equivalence between the automatic, visceral opposition to nuclear weapons that characterizes a taboo and the calculated opposition that emerges from a rational choice framework. The illusion of taboo takes its name from this near-equivalence.

One may ask how the rigid opposition of an illusory taboo is different from the opposition of a taboo. After all, if the negative downsides of a behavior prevent people from engaging in it, and these negative downsides occur frequently, then how is that different from a taboo? As noted above, taboos have an element of shame attached to them that goes beyond a cost-benefit calculus. When circumstances warrant a taboo behavior, individuals try to hide their activity from the rest of society. This stigma makes a taboo behavior different from one that is merely non-advantageous. For instance, in the car example, people would likely not choose the older car with a more powerful engine, but this does not mean there is

a taboo against acquiring older cars.

Yet, with nuclear use, opposition to a nuclear strike that caused major devastation would be moral in nature. It would be wrong to kill that many people. The illusion of taboo can incorporate individuals using moral arguments to justify their resistance to a behavior. For example, an individual could say that they are an environmentalist and put a moral value on protecting the environment. Getting the older car would therefore be wrong because its lower fuel efficiency would cause greater damage to the environment. The rigid opposition of an illusory taboo may be justified in moral terms, but it is ultimately guided by a cost-benefit calculus and not an affective aversion to the behavior itself.

This point allows us to connect the illusion of taboo argument to Tannenwald's historical research. Her case studies show policymakers grappling with strong opposition to nuclear use on the part of the public that is described in moral terms. Secretary Dulles identified the "inhibition on the use of the A bomb" as a "moral problem" (Tannenwald 2007, 143). It was in this context that Eisenhower and Dulles concluded that the "tabu which surrounds the use of atomic weapons must be destroyed" (Tannenwald 2007, 145). However, it may be wrong to describe this public opposition as a taboo against atomic or nuclear weapons themselves. The public may have regarded the killing of civilians in an atomic strike as morally reprehensible but would have supported a strike with a perceived decisive military advantage. In Korea, it may have been the case that there was no large military advantage that would outweigh the downsides of atomic use. Indeed, Eisenhower believed that atomic weapons would prove decisive if used in Korea, but the level of tactical advantage was not high enough for the Joint Chiefs of Staff to think so (Tannenwald 2007, 146-147). Decision-makers may have then calculated that the public would oppose the use of atomic weapons in Korea. This opposition would be posed as a "moral problem" but be based on a rational cost-benefit calculus. The public resistance to nuclear use described in case studies could be consistent with the logic of an illusory taboo.

This is important because another question about the illusory taboo is whether it pre-

cludes a public check on policymakers. In instances where the salient benefits of nuclear use outweigh the costs of using nuclear weapons, then the public does not act as a constraint on policymakers. However, in a scenario where a policymaker discounts the negative consequences of a militarily advantageous nuclear strike, the public may act as a constraint on that policymaker. Nuclear use could produce domestic political backlash that persuades the policymaker against nuclear use. Interestingly, our results below highlight that the limited gut aversion the public does appear to hold would be at its most influential precisely in situations where the there is some strategic advantage to nuclear use.

Research Design

To examine whether actual public preferences towards nuclear use fit the models of a taboo, what we've termed an illusory taboo, or something else, we conducted a novel set of vignette and choice experiments over the course of two studies. Study 1 was conducted in August 2018 ($N = 512$). Study 2 was conducted in December 2019 ($N = 2,136$) and was pre-registered. Respondents were recruited through Lucid, an online platform that quota samples to Census benchmarks. Previous work has found that Lucid produces similar treatment effects as other commonly used online samples (Coppock and McClellan 2019). To increase the representativeness of our sample, we weight the results by demographic characteristics, education, and, in Study 2, a battery of questions on foreign policy attitudes (see the appendix).

Vignette Experiments

Both vignette experiments extend the Press et al. (2013) design. In all conditions, respondents read a faux-news article describing a national security crisis involving the threat of nuclear terrorism. The article describes an al-Qaeda weapons lab near a remote town in Syria that is believed to be close to developing a nuclear weapon that could be used against the U.S. homeland. A leaked report to the president describes two military options

Table 2: Design table, vignette experiments.

	$d = 0$			$d = 1$		
	Equal chance of success, equal destruction			Equal chance of success, nuclear more destructive		
		Nuke	*Conv.*		*Nuke*	*Conv.*
$s = 0$	*Success*	90%	90%	*Success*	90%	90%
	Civilians	1,000	1,000	*Civilians*	1,000	100
	Damage	Minimal	Minimal	*Damage*	Severe	Minimal
	Backlash	No	No	*Backlash*	Yes	No
	Nuke better chance, equal destruction			Nuke better chance, nuclear more destructive		
		Nuke	*Conv.*		*Nuke*	*Conv.*
$s = 1$	*Success*	90%	70%	*Success*	90%	70%
	Civilians	1,000	1,000	*Civilians*	1,000	100
	Damage	Minimal	Minimal	*Damage*	Severe	Minimal
	Backlash	No	No	*Backlash*	Yes	No

for destroying the al-Qaeda facility, one using conventional weapons and one using nuclear weapons.

Study 2's vignette experiment manipulated the features of these strikes in two ways: (1) the relative effectiveness of the strike options and (2) their material consequences in terms of civilian casualties, environmental destruction, and international backlash. For each treatment condition, we included a headline, a table, and block quotes that contained the salient information about the probability of success of the two strikes and their expected levels of collateral damage. Table 2 summarizes the differences in strike features between the four treatment conditions. Study 1's vignette experiment featured only the effectiveness manipulation, holding constant that nuclear weapons produce greater civilian casualties, environmental destruction, and international backlash (i.e., the $d = 1$ column in Table 2). In all other respects, it was very close to Study 2.

In designing both vignette experiments, we hewed as closely as possible to Press and colleagues' original design. However, in the $d = 1$ conditions, changing the number of civilian casualties, the amount of physical destruction, and the reaction of allies required some text

modifications. In effect, the $d = 1$ condition provides a parallel experiment to Press and colleagues' experiment on military utility, but with a more common set of disadvantages ascribed to the nuclear strike.[5] Sticking as close as possible to the original vignette in the Press, Sagan, and Valentino study not only makes our results comparable, but it also allows us to include their findings in a meta-analysis of the effects of tactical military advantages across the two damage conditions.

A downside of focusing on the difference between two treatment effects is that statistical power is limited. To boost our power to detect differences between the two conditions, we elected not to include a scenario in which conventional weapons were only 45 percent effective, which was included in Press et al. (2013).[6]

Choice Experiments

For the most detailed test of our model's predictions, we turn to choice experiments. After completing the vignette experiment, subjects made choices between a series of randomly-generated strikes. In Study 2, each strike had six characteristics:

1. type of strike (conventional or nuclear)
2. chance of success (90 or 70 percent)
3. U.S. military casualties (minimal, low, or high)
4. civilian casualties (about 10, 100, or 1,000)
5. environmental damage (minimal, moderate, or high)
6. approval of U.S. allies (few or most; study 2 only)

These attributes accord with the typical advantages and disadvantages of nuclear strikes, both in the real world and as operationalized in prior work on the public's nuclear attitudes. Our two possible advantages—a greater chance of success and fewer U.S. military casualties—are the two possible advantages included in Press et al. (2013) and Sagan and Valentino

[5]Arguably, our decision to follow the Press et al. (2013) decision to limit the nuclear strike to only 1,000 civilian casualties is unrealistic. However, working within the numbers used in the original design adds to the comparability of our results.

[6]The 30+ percentage point treatment effect for strike preference shown in Press et al. (2013) when conventional weapons were varied from 90 to 70 percent effectiveness gives us further confidence that omitting the 45 percent scenario does not constitute under-dosing the probability of success treatment.

(2017), respectively. The three key disadvantages—that they are likely to kill more civilians, cause more environmental destruction, and have lower approval among allies—are standard drawbacks of nuclear weapons highlighted in prior studies.

Six of the twelve tasks in Study 2 fully randomized all of the strike characteristics. Study 1's choice experiment, which used five of the same six attributes, was also completely random. The other six Study 2 choice tasks restricted the randomization to more likely choices between nuclear and conventional strikes using the following rules:

- The nuclear strike always kills at least as many civilians as the conventional strike.
- The nuclear strike always causes at least as much environmental damage.
- The nuclear strike never has greater approval among allies.
- The nuclear strike always has at least as large a chance of success.
- The nuclear strike never results in more military casualties.
- All strikes are nuclear versus conventional.

In Study 1, the choice experiment was identical in most respects to the fully randomized arm of the Study 2 choice experiment. The exception is that rather than the approval of U.S. allies, that experiment randomized whether or not the U.S. would have the opportunity to conduct a follow-up strike. Because this strategic consideration did not seem to have any influence on the respondents' choices, we replaced it for Study 2.

Choice Experiment Results

Our first look at the public's strike preferences comes from the choice experiments. We begin with the restricted choice experiment, which always pits a nuclear strike against a conventional alternative and places modest limits on the type of comparisons that subjects see. In these scenarios, nuclear weapons can never cause more environmental damage, civilian casualties, or disapproval from allies than a conventional strike. This roughly reflects the range of variation in existing studies. The strikes with no disadvantages are similar to Press et al. (2013) and the "equal consequences" ($d = 0$) condition of our original experiment. The strike options with disadvantages are more similar to Koch and Wells (2020), Carpenter and

Montgomery (2020), Post and Sechser (n.d.), and the "nuclear more destructive" ($d = 1$) condition of our vignette experiment. Meanwhile, the conventional strike can never be more effective or result in fewer U.S. military casualties.

We first zoom in on the two states of the world that we contrast in our predictions above. In the first, nuclear weapons carry what we term their *realistic* set of downsides. They remain linked to more civilian casualties, more environmental damage, and more international backlash than a conventional alternative. In second state of the world, nuclear weapons are what we term *denatured*, or stripped of their typical destructiveness such that they are no worse than conventional weapons in producing civilian casualties, environmental destruction, and international opprobrium.

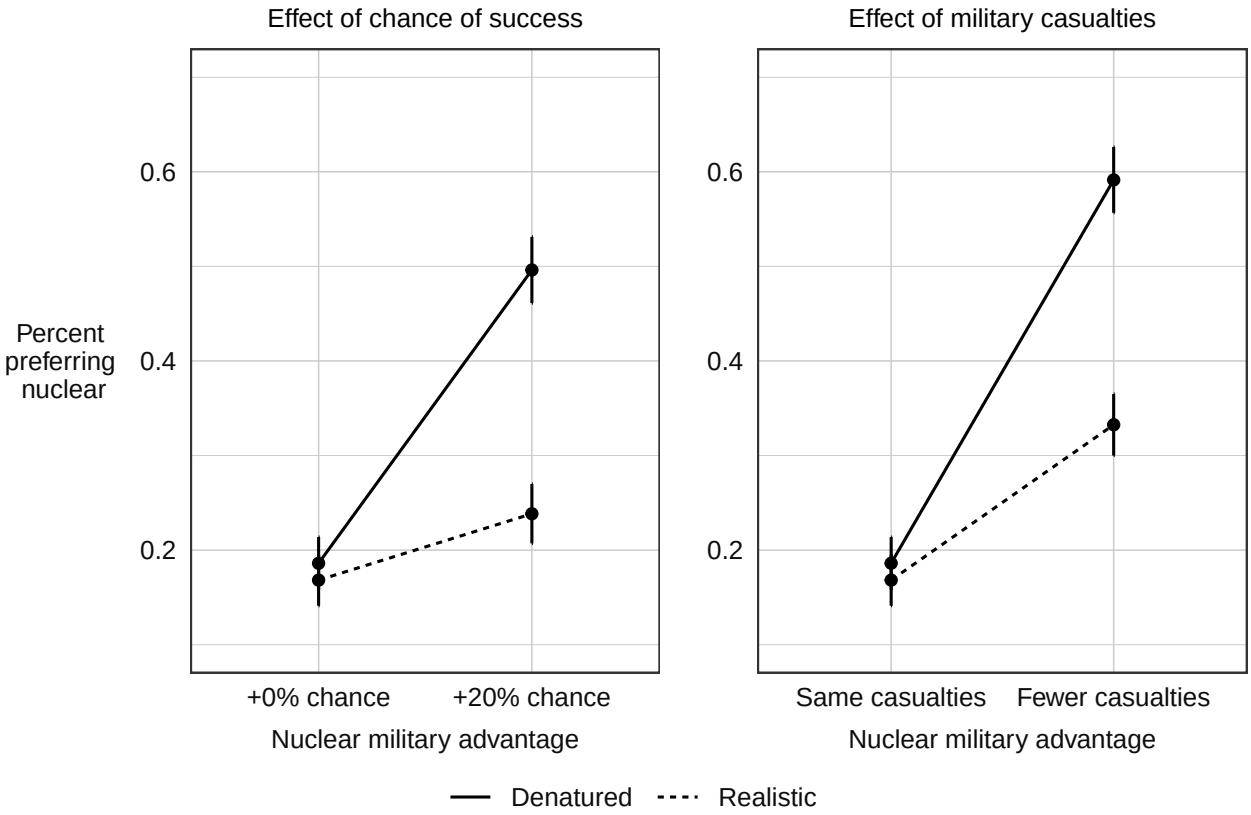
Figure 3 shows the effect of assigning nuclear weapons military advantages—increased probability of a successful strike or reduced U.S. military casualties—in these two states of the world. When nuclear weapons are divorced from their typical negative side-effect (solid lines), majorities may be persuaded to support nuclear use if it offers greater military effectiveness or reduces U.S. military casualties. But, as predicted, these effects are conditional on and muted by the negative side-effects of nuclear weapons. When nuclear strikes are tied to their usual disadvantages in terms of civilian casualties, environmental harm, and international political costs (dashed line), the *effect* of military utility falls considerably. Consistent with an illusory taboo, when nuclear weapons remain linked to their negative side-effects, large majorities prefer a conventional strikes to nuclear alternatives that carry military advantages.

As a statistical test for these patterns, we pre-registered a linear model that quantifies how the effect of military utility varies with the number of disadvantages ascribed to a nuclear strike. We use OLS to estimate the parameters in

$$Y_{ij} = \alpha_0 + \delta_0 D_{ij} + \alpha_M M_{ij} + \alpha_S S_{ij} + \delta_M M_{ij} D_{ij} + \delta_S S_{ij} D_{ij} + \epsilon_i, \tag{1}$$

where D_{ij} is a disadvantage index that ranges from 0 to 3, summing the number of dis-

Figure 3: Effect of military advantages when nuclear weapons are denatured vs. realistic.



Note: Figure plots the percentage of respondents who chose a nuclear strike over a conventional strike (y-axis) as a function of the nuclear strike's advantage or disadvantage relative to a conventional strike (x-axis). Solid lines connect strike comparisons that are realistic, meaning that the nuclear option involved more civilian casualties, environmental destruction, and international condemnation than the conventional strike. Dashed lines connect strike comparisons in which nuclear weapons are denatured, meaning that both strike options are the same on those dimensions. Vertical bars represent 95 percent confidence intervals. The appendix presents all estimates in tabular form.

advantages often associated with nuclear strikes—high civilian casualties, environmental destruction, and international backlash—that a nuclear strike is randomly assigned in our choice task. Disadvantage index scores of 3 are equivalent to the 'realistic' conditions in Figure 3, while disadvantage index scores of 0 are equivalent to the 'denatured' condition. Scores are 1 or 2 are somewhere in between. M_{ij} indicates fewer U.S. military casualties, and S_{ij} indicates a greater chance of success.

In (1), we chose the letters α and δ to signify the effects of advantages and disadvantages. α_0 is the probability that a respondent supports a nuclear strike that has no advantages or disadvantages, similar to the baseline condition in Press et al. (2013). α_M estimates the effect of an advantage on military casualties when there are zero disadvantages, while α_S estimates the effect of a greater chance of success. The main parameters of interest, δ_M and δ_S, respectively estimate whether the presence of disadvantages reduces the effect of the two advantages. δ_0 is the marginal effect of a disadvantage when no advantages are present. The illusion of taboo taboo framework predicts that all three δ parameters should be negative.

We find strong support for the illusion of taboo framework's two-part prediction of lower baseline support and, crucially, non-constant effects of military advantages. In Table 3, the negative estimate of δ_0 confirms the lower baseline support aspect. When no advantages are present, each disadvantage reduces support for a nuclear strike by about 2 percent.

We test for non-constant effects using δ_M and δ_S. The negative estimates for these parameters in Table 3 show that when the nuclear weapons are presented as having their typical disadvantages, the two possible advantages of nuclear strikes considered in previous research—U.S. military casualties and a better chance of success—have smaller effects on strike support. With the addition of each marginal disadvantage, the marginal effect of both possible military advantages falls by about 4 percent. When nuclear weapons are completely denatured, with a disadvantage index of zero, the effects of fewer military casualties and a greater chance of success are estimated at 28 and 18 percent, respectively. When nuclear

Table 3: Regression test for conditional effect of nuclear advantages and disadvantages.

	No controls	Controls
α_0 Constant	0.221	0.266
	(0.017)	(0.033)
δ_0 Disadvantages (0-3 scale)	−0.021	−0.026
	(0.008)	(0.006)
α_M Fewer military casualties	0.283	0.280
	(0.021)	(0.014)
α_S Better chance of success	0.184	0.165
	(0.020)	(0.013)
δ_M Disadvantages × fewer mil. casualties	−0.038	−0.039
	(0.010)	(0.007)
δ_S Disadvantages × better chance	−0.044	−0.035
	(0.010)	(0.007)
Adj. R^2	0.096	0.124
Num. obs.	12154	12136
N Clusters	2054	2051

Note: Table presents OLS estimates of the parameters in (1). Standard errors clustered by respondent. The appendix shows that these results are robust to the inclusion of indicators of the respondent's treatment assignment in the vignette experiment.

weapons are presented with their more frequent downsides, with a disadvantage index of three, these estimates fall to 16 and 5 percent.

A further implication of Table 3 is that even if a nuclear strike has an advantage in military effectiveness *and* U.S. military lives lost, the effect is not enough to generate majority support provided that nuclear weapons have their commonly expected disadvantages. The predicted probabilities of support from the no-controls model suggest that in such a circumstance, about 38 percent of respondents would prefer the nuclear strike. By contrast, when nuclear weapons are denatured, the predicted probabilities suggest that 69 percent of respondents would prefer a nuclear strike with both advantages. In the appendix, we plot the raw means and find very similar results. About 39 percent prefer a nuclear strike with both advantages in the common scenario, compared with 65 percent in the denatured scenario.

We next turn to our unrestricted conjoint, in which all strike attributes were ran-

domized independently from one another. This provides a second, independent look at our prediction of conditional effects. As in our predictions above, we abstract away from specific advantages and disadvantages to construct a summary variable for the net advantages that a strike has over an alternative across all dimensions of the choice. This yields a net advantage index that ranges from -4 to 4 in Study 1 and -5 to 5 in Study 2 for each strike option. For example, in Study 2, a nuclear strike that has a higher probability of success than a conventional alternative but would not save more U.S. military lives and would kill more civilians, cause greater environmental harm, and elicit greater disapproval from allies would have a net advantage score of -2 ($1 - 0 - 1 - 1 - 1 = -2$).

Figure 4 shows preferences as function of a strike's net advantages. The solid line traces respondents' preferences for a nuclear strike over a conventional alternative. The dashed line, a comparison of two conventional strikes, allows us to explicitly compare our respondents' preferences for nuclear strikes to our respondents' preferences for purely conventional uses of force.

As predicted by our theory, the effect of the marginal net advantage is not constant, but rather conditional on surrounding strike choice features and smallest when nuclear strikes carry many net disadvantages. This is visible on the left-hand side of the chart. In this region, the solid line hardly rises at all with the marginal advantage. This result is at the core of the illusory taboo argument: if nuclear weapons almost always carry many disadvantages at baseline, majority support for nuclear use is out of reach, potentially exerting constraining effects on policymakers.

The middle and right-hand side of Figure 4 better captures survey experiments that find the highest levels public support for nuclear weapons, particularly the prospective conditions presented in the main Press et al. (2013) article. That experiment portrayed nuclear and conventional options as roughly equivalent to a conventional alternative in terms of their side effects (Table 1). Consistent with these experiments, we find that when the baseline number of net advantages is around zero, the marginal advantage can have a large effect and

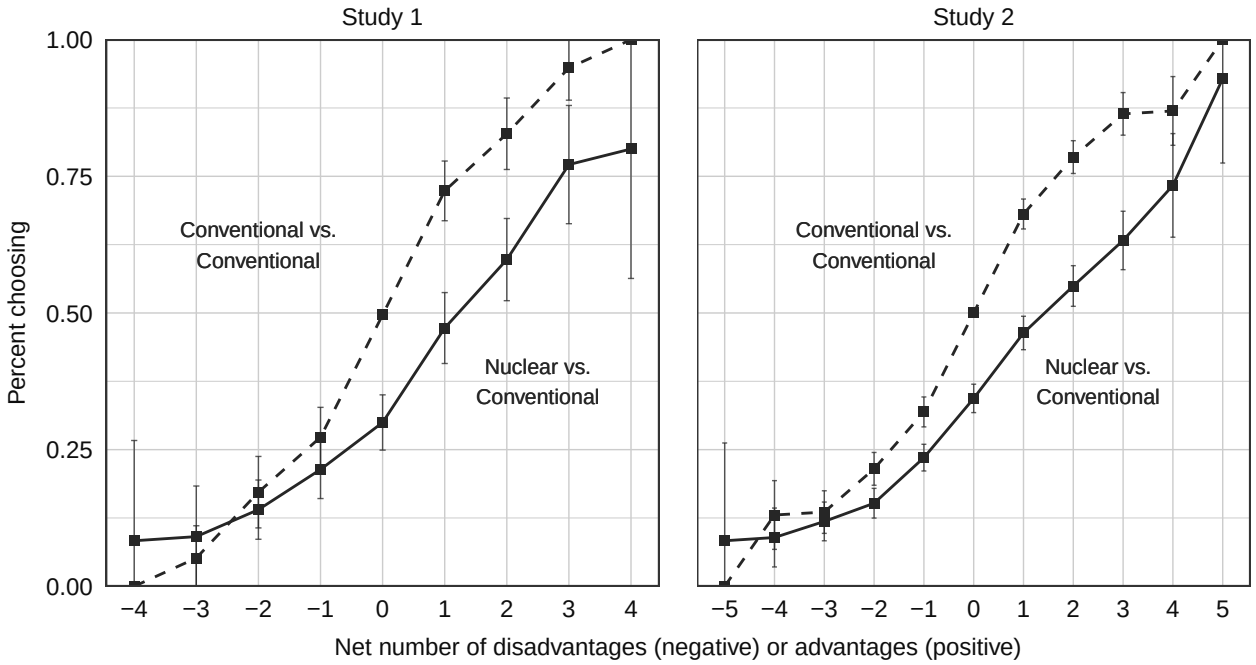
push preferences near or above 50 percent.

We next examine the implication of the illusion of taboo theory that people treat the choice to use nuclear weapons similar to how they would treat the choice between two conventional strikes. What creates near taboo-like opposition is not that people think about nuclear weapons so differently from everything else, but that nuclear weapons are defined by instrumentally bad consequences. This suggests that preferences in comparisons between two conventional strikes should follow a similar pattern as nuclear-conventional choices. In particular, when a conventional weapon carries many disadvantages, it should not enjoy much more support than a similarly disadvantaged nuclear strike.

As a basis for this comparison, the dashed lines in Figure 4 display our respondents' average preference between two conventional strikes with the same number of advantages and disadvantages. Consistent with the illusory taboo account, support for conventional strikes that have net disadvantages is fairly low, and is quite similar to nuclear strikes with the same number of disadvantages. At many of the leftmost points in each panel of Figure 4, preferences for the two strike types are statistically indistinguishable from one another. Solid majorities consistently oppose strikes that carry disadvantages, and at similar rates for both weapon types. This implies that when a strike is defined as having a lot of disadvantages, it will be consistently and rigidly opposed by public majorities. As long as nuclear weapons are defined by their negative disadvantages, observed preferences resembling a taboo can emerge without much of the affective or gut aversion vividly described in taboo accounts.

Finally, our explicit comparison to choices between conventional strikes also reveals a feature of the public's preferences that is not a core part of our theory, but points to a scenario in which the public could dissuade policymakers from choosing nuclear strikes even when those strikes have a net advantage. On the right-hand side of Figure 4, public support for nuclear strikes is alarmingly high, just as Press et al. (2013) found. However, it is also in this region that the gap in public support between nuclear and conventional strikes is largest. Comparing the horizontal distance between the dashed and solid lines in Figure 4

Figure 4: Net advantage comparison.



Note: Figure plots the percentage of respondents who chose a nuclear strike over a conventional strike (y-axis) as a function of the nuclear strike's advantage or disadvantage relative to a conventional strike (x-axis). Vertical bars represent 95 percent confidence intervals. The appendix presents all estimates in tabular form.

suggests that in this region, a nuclear strike would need to offer two to three advantages just to break even in terms of public support. This means that for a leader tempted to use nuclear weapons, the marginal cost in public support is highest in precisely the circumstances that offer the best strategic case for, and highest public support for, a nuclear strike. When faced with the choice between a strike that might be supported by a bare majority of the public and one that would be supported by a large majority of the public, we suspect that election-motivated policymakers might take the large majority.

Vignette Experiment Results

This pattern of conditionally strong aversion to nuclear use should also appear in the survey vignette experiments commonly used in the experimental literature on nuclear attitudes. To examine this, we look at results from our original studies and nearly-identical

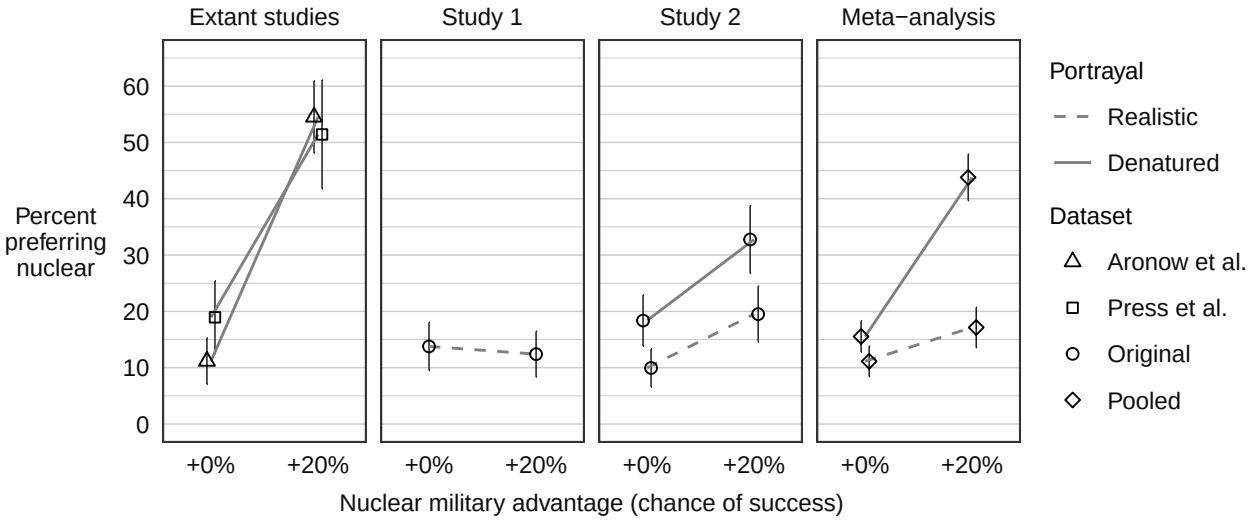
designs in previously published work. The far left panel of Figure 5 plots results from Press and colleagues' original experiment, as well as a replication undertaken by Aronow, Barron and Pinson (2019). Both experiments found that when nuclear and conventional weapons cause equal levels of civilian casualties and environmental destruction, baseline support for nuclear use lies between 10 and 20 percent. In conditions that kept collateral damage equal and increased nuclear weapons' advantage in military utility, support exceeded 50 percent.

Our initial study, Study 1, closely reproduced this setup, but we added modest textual changes to provide information about the disadvantages that typically accompany nuclear strikes, such as higher civilian casualties and environmental damage. These results are displayed in the middle-left panel of Figure 5. For a nuclear and conventional strike that are equally effective, we find 12 percent support for the nuclear strike, similar to the results in Press et al. (2013) and Aronow et al. (2019). Despite the similar levels of baseline support, however, Study 1 found substantially more resistance to persuasion than observed in these studies. In fact, our subjects in Study 1 appeared almost completely insensitive to the addition of a military advantage.

The lack of a treatment effect for tactical effectiveness in Study 1 is consistent with our illusion of taboo theory. However, it is also consistent with the categorical opposition of a true taboo, meaning that we could not rule out that explanation with our first study. Thus, examining our Study 1 findings in light of those of Press and colleagues and Aronow, Barron and Pinson (2019), we hypothesized that preferences for nuclear use is likely closer to the illusion of taboo pattern. We designed Study 2 to test this intuition.

In Study 2, we replicated our vignettes from Study 1 where nuclear weapons had greater disadvantages but varied in their military utility. We found a similar pattern to Study 1 when nuclear weapons came with negative material consequences. When the disadvantages of nuclear strikes are present, baseline support for nuclear strikes is low (11.0 percent) and increases only modestly in response to a randomly assigned advantage in military utility (19.6 percent; difference = 8.6 percent, se = 2.5 percent, $p < 0.01$). We attribute the modest

Figure 5: Vignette experiments on nuclear attitudes.



Note: Figure plots the percentage of respondents preferring a nuclear strike over a conventional strike (y-axis) by treatment group (x-axis). Vertical bars represent 95 percent confidence intervals. The appendix presents all estimates in tabular form.

differences between these results and our Study 1 results to sampling error.

To statistically test the illusory taboo framework's predictions of lower baseline support and resistance to persuasion, we use OLS to estimate a pre-registered linear model,

$$Y_i = \beta_0 + \beta_1 S_i + \beta_2 D_i + \beta_3 S_i D_i + \epsilon_i, \tag{2}$$

where Y_i is an indicator for preferring the nuclear option and D_i and S_i are the same treatment indicators we defined in Table 2 and used in our analysis of the choice experiments above.

We find support for our account's prediction of larger treatment effects in the presence of less severe consequences. Controlling for the full set of covariates that our pre-analysis plan listed as potentially prognostic, we find that when the nuclear and conventional strikes are presented as causing similar levels of civilian casualties and physical destruction, giving nuclear weapons greater military utility (in the form of a better chance of success) boosts support for a nuclear strike by 13.6 percent (s.e. = 3.7). Changing the vignette to ascribe

Table 4: Regression test for original vignette experiments.

	Study 1		Study 2	
Term Controls?	No	Yes	No	Yes
β_1 Better chance of success	−0.014	−0.014	0.144	0.136
	(0.030)	(0.030)	(0.038)	(0.037)
β_2 More destructive			−0.084	−0.064
			(0.029)	(0.029)
β_3 Better chance × more destructive			−0.048	−0.065
			(0.049)	(0.046)
α Constant	0.138	0.209	0.184	0.227
	(0.022)	(0.168)	(0.023)	(0.079)
Adj. R^2	-0.002	0.025	0.043	0.128
Num. obs.	512	512	2136	2136

Note: Table presents OLS estimates of the parameters in (2). Standard errors clustered by respondent.

more frequently associated and severe consequences to nuclear weapons — more civilian casualties, greater physical destruction, and the condemnation of allies — reduces support for nuclear strikes at baseline ($\hat{\beta}_2 = -6.4$ percent, s.e. $= 2.9$) and may also mitigate the effect of military utility. Our difference in differences estimate, β_3, suggests that adding these disadvantages reduced the effect of military utility by 6.5 percent (se = 4.6). This test—the least statistically precise of the several we present in this study—does not attain conventional levels of statistical significance, but provides suggestive evidence in favor of the illusion of taboo framework.

To further examine the illusory taboo framework's predictions, we conduct a pooled meta-analysis that combines all available studies that have examined the four cells in our 2×2 experiment (Table 5). The first stage of our meta-analysis combines just our original data from Study 1 and Study 2. We find that the effect of giving nuclear weapons greater military utility rises slightly ($\hat{\beta}_1 = 14.8$, s.e. $= 3.8$). Most importantly, we find clearer evidence for the conditional effect of military utility implied by our illusory taboo framework: our pooled estimate of the conditional effect of military utility is −9.1 percentage points (s.e. = 4.4).

Table 5: Meta-analytic estimates.

		Original Studies		All Studies	
Term	Controls?	No	Yes	No	Yes
β_1	Better chance of success	0.144	0.148	0.233	0.234
		(0.038)	(0.038)	(0.018)	(0.018)
β_2	More destructive	−0.072	−0.039	−0.049	−0.052
		(0.027)	(0.028)	(0.016)	(0.016)
β_3	Better chance × more destructive	−0.084	−0.091	−0.180	−0.183
		(0.045)	(0.044)	(0.025)	(0.025)
α	Constant	0.184	0.203	0.172	0.183
		(0.023)	(0.045)	(0.011)	(0.026)
Adj. R^2		0.039	0.057	0.072	0.075
Num. obs.		2648	2648	4014	4014

Note: Table presents OLS estimates of the parameters in (2). Standard errors clustered by respondent.

This provides further support for our predictions.

We complete our meta-analysis by merging our data with data collected by Press et al. (2013) and Aronow et al. (2019). Using all of the available data provides even stronger support for the illusion of taboo theory and the non-constant treatment effects it implies. In the rightmost pair of columns in Table 5, we see that our experiments may have underestimated the effect of military utility: the meta-analytic estimate suggests a 23.4 percent boost in support ($\hat{\beta}_1 = 23.4$, s.e. $= 1.8$). Much of, but not all of, this effect appears to be erased by emphasizing rather than downplaying the disadvantages of nuclear strikes ($\hat{\beta}_3 = -18.3$, s.e. $= 2.5$).

The aggregate evidence we present in our vignette experiments comports with the results of our choice experiments and with the illusion of taboo hypothesis. The effect of nuclear weapons' military advantages is conditional on their disadvantages. When nuclear weapons remain tied to their typical downsides, public support is low and resistant to persuasion, much as it would be under a true taboo.

Conclusions

Accounts of public opinion toward the use of nuclear weapons vary substantially, ranging from a categorical taboo to a dominant role for military utility. We bridge the gaps between these accounts showing how an illusory taboo can emerge from a rational choice framework. When nuclear weapons are clearly associated with civilian casualties, environmental destruction, and international backlash, these disadvantages weigh down public support *and* reduce the persuasive effect of military advantages. This is produces a pattern of low support and resistance to persuasion, which we term an illusory taboo.

The illusory taboo account adds a new perspective to the decades-old debate over the "conventionalization" of nuclear weapons (Jervis 1989). Nuclear weapons may be conventionalized in the sense that people think about the advantages and disadvantages of a nuclear strike in much the same way that they think about the use of conventional weapons. However, even if nuclear weapons *are* conventionalized, they may still evoke attitudes in the public that operate *like* a taboo. Portrayals of nuclear weapons that emphasize their frequently associated catastrophic side effects can give rise to preferences that have some characteristics—such as consistent and rigid opposition—of a taboo.

Our findings have several implications for scholars and policymakers. First, we bring greater coherence to the ongoing debate on public opinion and nuclear use. Though we are not the first to point out using survey research that support for nuclear weapons is lower when the consequences are worse or are amplified (e.g., Koch and Wells (2020) and Post and Sechser (n.d.)), we situate this point within a general framework that accommodates the full range of findings in the experimental literature. Press et al. (2013) were right to highlight that military utility matters. However, preference for nuclear use does not rise "steadily" (189) with military utility; the effect of military utility is conditional on surrounding strike variables.

Second, our framework identifies one condition in which the public's limited "gut"

aversion could nonetheless constrain policymakers from launching a tactically advantageous nuclear strike. We compared choices between a nuclear and conventional strike to choices between two conventional weapons. This revealed that the biggest gap in public support between a nuclear and conventional strike exists when for strikes that offer one or two net advantages. Both strikes receive majority support, but the former receives 70 to 80 percent support versus 50 to 60 percent support for the latter. Though we will refrain from speculating as to how much a leader would value this difference, our finding suggests that there is more to learn about the full set of tradeoffs in public support that leaders may face.

Our empirical strategy for examining the full implication of rational choice accounts of the public's preferences introduces a new set of tools for studying the public's degree of resistance to nuclear strikes. Prior work has generally tackled this question by holding fixed either the benefits or costs of nuclear use while randomly varying the other. We advance the literature by *independently* varying both cost and benefits to see not only their isolated effects, but their effects in relations to one another. We do this using both traditional vignette experiments and choice experiments that yield a much more granular version of the same basic patterns. The insights from our choice experiments highlight the value of pairing traditional vignette experiments' focus on two, four, or six scenarios with the more expansive look at the public's preference profile that can be drawn using choice experiments (e.g., Mummolo et al. 2019; Graham and Svolik 2020).

Unfortunately, our framework suggests that innovations in nuclear weapons technology may make even the illusion of a taboo difficult to maintain. Physicists at Los Alamos and Livermore have developed designs for "mini-nukes" with a fraction of the explosive power and fallout of current nuclear weapons (Fearey et al. 2003). If the level of resistance to nuclear weapons is conditional on their perceived side effects, it follows that lower-yield, less destructive nuclear weapons could be the perfect vehicle for rallying public support. If the "nuclear" modifier loses its association with highly negative side effects, the public may become more open to persuasion by the advantages of nuclear use.

Though our findings are consistent with existing evidence that the nuclear taboo is illusory, our account amounts to a relatively optimistic take on findings that members of the public can be persuaded to support nuclear use. Just as military advantages may rally substantial or even majority support for the use of nuclear weapons, the downsides of doing so act as a constraining force, reducing both the level of support for nuclear strikes and the persuasive power of the military advantages that can be invoked in their favor. So long as public debates over the use of nuclear weapons continue to highlight their negative side effects, we are optimistic that the public will remain consistently opposed to nuclear strikes.

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Appendix to

The Illusory Nuclear Taboo

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February 1, 2021

Contents

A Survey Information

A.1 Comparison Table

Table A.1: Comparison between Press, Sagan, and Valentino (2013) and this paper

Design Element	PSV (2013)	Study 1	Study 2
Treatment groups	(1) Equal chance of success (2) Nuclear 0.9, conventional 0.7 (3) Nuclear 0.9, conventional 0.45	(1) Equal chance of success (2) Nuclear better chance	(1) Equal chance of success, equal collateral damage ($s = 0$, $d = 0$) (2) Nuclear 0.9, conventional 0.7, equal collateral damage ($s = 1$, $d = 0$) (3) Equal chance of success, nuclear more destructive ($s = 0$, $d = 1$) (4) Nuclear 0.9, conventional 0.7, nuclear more destructive ($s = 1$, $d = 1$)
Consequences of failure	Possible al-Qaeda nuclear attack on U.S. homeland	Possible al-Qaeda nuclear attack on U.S. homeland	Possible al-Qaeda nuclear attack on U.S. homeland
Syrian civilian deaths	1,000 for both nuclear and conventional strike options	1,000 for nuclear strike and 100 for conventional strike	If $d = 0$: 1,000 for both. If $d = 1$: 1,000 for nuclear and 100 for conventional.
Environmental damage	Not mentioned for either strike option	None for conventional option, substantial for nuclear option	If $d = 0$: Not mentioned. If $d = 1$: substantial damage.
Approval of allies	Not mentioned	Not mentioned	If $d = 0$: not mentioned. If $d = 1$: may provoke disapproval.
U.S. military casualties	None	None	None

A.2 Vignette Screen Shots

Figure A.1: Study 1, Equal Probability of Success

Joint Chiefs Report Concludes Nuclear and Conventional Options for Destroying Al Qaeda Nuke Lab Equally Effective

But Nuclear Option Expected to Result in Far Greater Civilian Casualties and Environmental Destruction

The Associated Press

A report from General Joseph Dunford, Chairman of the Joint Chiefs of Staff, to the President concludes that military strikes using either nuclear or conventional weapons would be "equally effective" in destroying an Al Qaeda nuclear weapons facility in Syria. However, a nuclear strike could kill 10 times as many civilians as a conventional strike and result in widespread environmental destruction, possibly provoking international outrage.

The report compares two American military options, a conventional strike using nearly one hundred conventionally-armed cruise missiles, and an attack using two nuclear-armed cruise missiles. The report estimates that both options have a high probability of successfully destroying the Al Qaeda nuclear weapons lab.

Conventional and nuclear options would be "equally effective" in destroying the deeply buried target

The Joint Chiefs' assessment comes two weeks after Russian intelligence agents intercepted a shipment of centrifuges and low-enriched uranium, which could be used to produce nuclear weapons. The bomb-making equipment was being smuggled out of Russia to an Al Qaeda facility located near the town of Al-Safih in northern Syria.

The suspects in the smuggling operations were employed at a Russian nuclear lab. The smugglers confirmed under questioning that other shipments of centrifuges and low-enriched uranium had already been delivered to the Al Qaeda base, where the centrifuges are being used to make fuel for a nuclear bomb. The smugglers stated that there will be enough bomb grade material produced for at least one weapon within several months. Syria has refused to allow international inspectors access to the facility.

The Joint Chiefs' report to the President does not recommend a specific course of action. However, it concludes that "because the Al Qaeda facility is comprised of a series of deeply buried bunkers, a strike would require either large numbers of conventional missiles, or two nuclear weapons, to destroy the facility." Either option would have a strong chance of success, according to the report.

The report was leaked to the Associated Press by a high-ranking administration official involved in planning the strike. According to the official, the centrifuges and nuclear materials are too large to be moved without detection. For this reason, a US intelligence official stated that he has high confidence that there would be an opportunity to conduct additional strikes if an initial attack failed to fully destroy the target.

Intelligence indicates that there would be time to conduct a follow-on strike should initial attack fail to fully destroy weapons lab

Dr. David Wright, a nuclear weapons expert at the Union of Concerned Scientists, an independent think-tank based in Washington, D.C., said that it was possible that Al Qaeda would seek to target the US homeland if the group acquired nuclear weapons.

The report states that although the location of the Al Qaeda facility is remote, the destructive power of nuclear weapons would result in significantly more Syrian civilian fatalities than the conventional option. Military planners estimate 100 civilian casualties from a conventional strike, compared with 1,000 or more from a nuclear attack. Moreover, in addition to destroying much of the city, radiation from a nuclear strike could harm additional civilians not killed in the initial blast and would make the surrounding area uninhabitable for a year or more.

Nuclear option could kill 10 times as many civilians as the conventional strike, cause widespread environmental damage

Given the collateral damage expected from the nuclear option, some military and diplomatic officials fear that a nuclear strike could provoke condemnation in the international community. As both operations will rely on cruise missiles launched from U.S. naval vessels, the report concludes "no U.S. military personnel are at risk in either operation."

Figure A.2: Study 1, Nuclear Higher Probability of Success

Joint Chiefs Report Concludes Nuclear Option Only Provides Moderate Increase in Chances of Destroying Nuke Lab Over Conventional Strike

Nuclear Option Would Also Result in Far Greater Civilian Casualties and Environmental Destruction

The Associated Press

A report from General Joseph Dunford, Chairman of the Joint Chiefs of Staff, to the President concludes that a military strike using nuclear weapons would be "moderately more effective" than a strike using conventional weapons in destroying an Al Qaeda nuclear weapons facility in Syria. However, a nuclear strike could kill 10 times as many civilians as a conventional strike and result in widespread environmental destruction, possibly provoking international outrage.

The report compares two American military options, a conventional strike using nearly one hundred conventionally-armed cruise missiles, and an attack using two nuclear-armed cruise missiles. The report estimates that both options have a relatively high probability of success, with the nuclear option judged to offer a moderate increase in the chances of destroying the Al Qaeda nuclear weapons lab.

Nuclear weapons would be "moderately more effective" in destroying the deeply buried target

The Joint Chiefs' assessment comes two weeks after Russian intelligence agents intercepted a shipment of centrifuges and low-enriched uranium, which could be used to produce nuclear weapons. The bomb-making equipment was being smuggled out of Russia to an Al Qaeda facility located near the town of Al-Safih in northern Syria.

The suspects in the smuggling operations were employed at a Russian nuclear lab. The smugglers confirmed under questioning that other shipments of centrifuges and low-enriched uranium had already been delivered to the Al Qaeda base, where the centrifuges are being used to make fuel for a nuclear bomb. The smugglers stated that there will be enough bomb grade material produced for at least one weapon within several months. Syria has refused to allow international inspectors access to the facility.

The Joint Chiefs' report to the President does not recommend a specific course of action. However, it concludes that "because the Al Qaeda facility is comprised of a series of deeply buried bunkers, a strike would require either large numbers of conventional missiles, or two nuclear weapons, to destroy the facility."

The report was leaked to the Associated Press by a high-ranking administration official involved in planning the strike. According to the official, the centrifuges and nuclear materials are too large to be moved without detection. For this reason, a US intelligence official stated that he has high confidence that there would be an opportunity to conduct additional strikes if an initial attack failed to fully destroy the target.

Intelligence indicates that there would be time to conduct a follow-on strike should initial attack fail to fully destroy weapons lab

Dr. David Wright, a nuclear weapons expert at the Union of Concerned Scientists, an independent think-tank based in Washington, D.C., said that it was possible that Al Qaeda would seek to target the US homeland if the group acquired nuclear weapons.

The report states that although the location of the Al Qaeda facility is remote, the destructive power of nuclear weapons would result in significantly more Syrian civilian fatalities than the conventional option. Military planners estimate 100 civilian casualties from a conventional strike, compared with 1,000 or more from a nuclear attack. Moreover, in addition to destroying much of the city, radiation from a nuclear strike could harm additional civilians not killed in the initial blast and would make the surrounding area uninhabitable for a year or more.

Nuclear option could kill 10 times as many civilians as the conventional strike, cause widespread environmental damage

Given the collateral damage expected from the nuclear option, some military and diplomatic officials fear that a nuclear strike could provoke condemnation in the international community. As both operations will rely on cruise missiles launched from U.S. naval vessels, the report concludes "no U.S. military personnel are at risk in either operation."

Figure A.3: Study 2, Equal Probability of Success, Equal Collateral Damage ($s = 0$, $d = 0$)

Joint Chiefs Report: Nuclear and Conventional Options for Destroying Al Qaeda Nuke Lab Equally Effective

Expected Civilian Casualties, Physical Destruction Equivalent for Both Options

The Associated Press

A report from General Mark Milley, Chairman of the Joint Chiefs of Staff, to the President concludes that military strikes using nuclear or conventional weapons would be "equally effective" in destroying an Al Qaeda nuclear weapons facility in Syria. The nuclear and conventional strike options would cause equal levels of civilian casualties and environmental destruction.

The report compares two American military options, a conventional strike using nearly one hundred conventionally-armed cruise missiles, and an attack using two nuclear weapons. The report estimates that both options have a 90 percent chance of successfully destroying the Al Qaeda nuclear weapons lab.

Conventional and nuclear weapons would be "equally effective" against the buried Al Qaeda nuclear weapons base.

The Joint Chiefs' assessment comes two weeks after intelligence agents intercepted a shipment of centrifuges and low-enriched uranium, which could be used to produce nuclear weapons. The bomb-making equipment was being smuggled out of Russia to an Al Qaeda facility located near the town of Al-Safih in northern Syria.

The suspects in the smuggling operations were employed at a Russian nuclear lab. The smugglers confirmed under questioning that other shipments of centrifuges and low-enriched uranium had already been delivered to the Al Qaeda base, where the centrifuges are being used to make fuel for a nuclear bomb. The smugglers stated that there will be enough bomb grade material produced for at least one weapon within several months. Syria has refused to allow international inspectors access to the facility.

The Joint Chiefs' report to the President does not recommend a specific course of action. However, it concludes that "because the Al Qaeda facility is comprised of a series of deeply buried bunkers, a strike would require either large numbers of conventional missiles, or two nuclear weapons, to destroy the facility." Either option would have roughly a 90 percent chance of success, according to the report.

The report was leaked to the Associated Press by a high-ranking administration official involved in planning the strike. According to the official, the centrifuges and nuclear materials are too large to be moved without detection. A U.S. intelligence official states that he has high confidence that Al Qaeda is within months of producing an operational nuclear bomb. After that, the official said, "all bets are off."

Target: Al Qaeda Nuclear Lab		
	U.S. Nuclear Strike	U.S. Conventional Strike
Probability of Success	90%	90%
Estimated Syrian Civilian Deaths	1,000	1,000

Chart from Joint Chiefs' report describing nuclear and conventional options for strike on Al Qaeda nuclear lab.

According to Dr. David Wright, a nuclear weapons expert at the Union of Concerned Scientists, an independent think-tank based in Washington, D.C., "If a bomb of this size exploded in New York City, it could easily kill 50,000 to 70,000 people."

The report states that the remote location of the Al Qaeda facility should limit Syrian civilian fatalities for either option. Because many conventional weapons would be required to destroy the Al Qaeda base, the report estimates that "the two options would kill approximately the same number of Syrian civilians" – about 1,000, including immediate deaths and long term consequences of the conventional or nuclear strikes. The nuclear and conventional options would also cause roughly the same amount of physical and environmental damage.

Nuclear and conventional options would kill the same number of civilians, cause equivalent environmental harm

Neither strike option would rely on U.S. ground forces. For this reason, the report concludes that "no U.S. military personnel are at risk in either operation."

Figure A.4: Study 2, Nuclear Higher Probability of Success, Equal Collateral Damage ($s = 1$, $d = 0$)

Joint Chiefs Report: Nuclear Option Provides Moderate Increase in Chances of Destroying Al Qaeda Nuke Lab

Expected Civilian Casualties, Physical Destruction Equivalent for Both Options

The Associated Press

A report from General Mark Milley, Chairman of the Joint Chiefs of Staff, to the President concludes that nuclear weapons would be "moderately more effective" than conventional strikes in destroying an Al Qaeda nuclear weapons facility in Syria. The nuclear and conventional strike options would cause equal levels of civilian casualties and environmental destruction.

The report compares two American military options, a conventional strike using nearly one hundred conventionally-armed cruise missiles, and an attack using two nuclear weapons. The report estimates that the conventional strike has a 70 percent chance of successfully destroying the atomic bomb lab while nuclear weapons increases the chances of success to approximately 90 percent.

Nuclear weapons would be "moderately more effective" against this deeply buried target.

The Joint Chiefs' assessment comes two weeks after intelligence agents intercepted a shipment of centrifuges and low-enriched uranium, which could be used to produce nuclear weapons. The bomb-making equipment was being smuggled out of Russia to an Al Qaeda facility located near the town of Al-Safih in northern Syria.

The suspects in the smuggling operations were employed at a Russian nuclear lab. The smugglers confirmed under questioning that other shipments of centrifuges and low-enriched uranium had already been delivered to the Al Qaeda base, where the centrifuges are being used to make fuel for a nuclear bomb. The smugglers stated that there will be enough bomb grade material produced for at least one weapon within several months. Syria has refused to allow international inspectors access to the facility.

The Joint Chiefs' report to the President does not recommend a specific course of action. However, it concludes that "because the Al Qaeda facility is comprised of a series of deeply buried bunkers, nuclear weapons would be more effective for destroying this target."

The report was leaked to the Associated Press by a high-ranking administration official involved in planning the strike. According to the official, the centrifuges and nuclear materials are too large to be moved without detection. A U.S intelligence official states that he has high confidence that Al Qaeda is within months of producing an operational nuclear bomb. After that, the official said, "all bets are off."

Target: Al Qaeda Nuclear Lab		
	U.S. Nuclear Strike	U.S. Conventional Strike
Probability of Success	90%	70%
Estimated Syrian Civilian Deaths	1,000	1,000

Chart from Joint Chiefs' report describing nuclear and conventional options for strike on Al Qaeda nuclear lab.

According to Dr. David Wright, a nuclear weapons expert at the Union of Concerned Scientists, an independent think-tank based in Washington, D.C., "If a bomb of this size exploded in New York City, it could easily kill 50,000 to 70,000 people."

The report states that the remote location of the Al Qaeda facility should limit Syrian civilian fatalities for either option. Because many conventional weapons would be required to destroy the Al Qaeda base, the report estimates that "the two options would kill approximately the same number of Syrian civilians" – about 1,000, including immediate deaths and long term consequences of the conventional or nuclear strikes. The nuclear and conventional options would also cause roughly the same amount of collateral and environmental damage.

Nuclear and conventional options would kill the same number of civilians, cause equivalent environmental harm

Neither strike option would rely on U.S. ground forces. For this reason, the report concludes that "no U.S. military personnel are at risk in either operation."

Figure A.5: Study 2, Equal Probability of Success, Nuke More Collateral Damage ($s = 0$, $d = 1$)

Joint Chiefs Report: Nuclear and Conventional Options for Destroying Al Qaeda Nuke Lab Equally Effective

Nuclear Option Expected to Result in Far Greater Civilian Casualties and Environmental Destruction

The Associated Press

A report from General Mark Milley, Chairman of the Joint Chiefs of Staff, to the President concludes that military strikes using either nuclear or conventional weapons would be "equally effective" in destroying an Al Qaeda nuclear weapons facility in Syria. However, a nuclear strike could kill 10 times as many civilians as a conventional strike and result in widespread environmental destruction, possibly leading to criticism from American allies.

The report compares two American military options, a conventional strike using nearly one hundred conventionally-armed cruise missiles, and an attack using two nuclear weapons. The report estimates that both options have a 90 percent chance of successfully destroying the Al Qaeda nuclear weapons lab.

Conventional and nuclear options would be "equally effective" against the buried Al Qaeda nuclear weapons base.

The Joint Chiefs' assessment comes two weeks after intelligence agents intercepted a shipment of centrifuges and low-enriched uranium, which could be used to produce nuclear weapons. The bomb-making equipment was being smuggled out of Russia to an Al Qaeda facility located near the town of Al-Safih in northern Syria.

The suspects in the smuggling operations were employed at a Russian nuclear lab. The smugglers confirmed under questioning that other shipments of centrifuges and low-enriched uranium had already been delivered to the Al Qaeda base, where the centrifuges are being used to make fuel for a nuclear bomb. The smugglers stated that there will be enough bomb grade material produced for at least one weapon within several months. Syria has refused to allow international inspectors access to the facility.

The Joint Chiefs' report to the President does not recommend a specific course of action. However, it concludes that "because the Al Qaeda facility is comprised of a series of deeply buried bunkers, a strike would require either large numbers of conventional missiles, or two nuclear weapons, to destroy the facility." Either option would have roughly a ninety percent chance of success, according to the report.

The report was leaked to the Associated Press by a high-ranking administration official involved in planning the strike. According to the official, the centrifuges and nuclear materials are too large to be moved without detection. A U.S. intelligence official states that he has high confidence that Al Qaeda is within months of producing an operational nuclear bomb. After that, the official said, "all bets are off."

Target: Al Qaeda Nuclear Lab		
	U.S. Nuclear Strike	U.S. Conventional Strike
Probability of Success	90%	90%
Estimated Syrian Civilian Deaths	1,000	100

Chart from Joint Chiefs' report describing nuclear and conventional options for strike on Al Qaeda nuclear lab.

According to Dr. David Wright, a nuclear weapons expert at the Union of Concerned Scientists, an independent think-tank based in Washington, D.C., "If a bomb of this size exploded in New York City, it could easily kill 50,000 to 70,000 people."

The report states that despite the remote location of the Al Qaeda facility, the destructive power of nuclear weapons would result in significantly more Syrian civilian fatalities than the conventional option. Military planners estimate 100 civilian deaths from a conventional strike, compared with 1,000 or more from a nuclear attack. Moreover, in addition to destroying much of the city, radiation from a nuclear strike could have negative health consequences for the local populace and would make the surrounding area uninhabitable for a year or more.

Nuclear option could kill 10 times as many civilians as the conventional strike, cause widespread environmental damage

Given the collateral damage expected from the nuclear option, some military and diplomatic officials fear that a nuclear strike could provoke condemnation from some U.S. partners and allies.

Neither strike option would rely on U.S. ground forces. For this reason, the report concludes that "no U.S. military personnel are at risk in either operation."

Figure A.6: Study 2, Nuclear Higher Probability of Success, Nuclear More Collateral Damage ($s = 1$, $d = 1$)

Joint Chiefs Report: Nuclear Option Provides Moderate Increase in Chances of Destroying Al Qaeda Nuke Lab

Nuclear Option Expected to Result in Far Greater Civilian Casualties and Environmental Destruction

The Associated Press

A report from General Mark Milley, Chairman of the Joint Chiefs of Staff, to the President concludes that nuclear weapons would be "moderately more effective" than conventional strikes in destroying an Al Qaeda nuclear weapons facility in Syria. However, a nuclear strike could kill 10 times as many civilians as a conventional strike and result in widespread environmental destruction, possibly leading to criticism from American allies.

The report compares two American military options, a conventional strike using nearly one hundred conventionally-armed cruise missiles, and an attack using two nuclear weapons. The report estimates that the conventional strike has a 70 percent chance of successfully destroying the atomic bomb lab while nuclear weapons increases the chances of success to approximately 90 percent.

Nuclear weapons would be "moderately more effective" against this deeply buried target.

The Joint Chiefs' assessment comes two weeks after intelligence agents intercepted a shipment of centrifuges and low-enriched uranium, which could be used to produce nuclear weapons. The bomb-making equipment was being smuggled out of Russia to an Al Qaeda facility located near the town of Al-Safih in northern Syria.

The suspects in the smuggling operations were employed at a Russian nuclear lab. The smugglers confirmed under questioning that other shipments of centrifuges and low-enriched uranium had already been delivered to the Al Qaeda base, where the centrifuges are being used to make fuel for a nuclear bomb. The smugglers stated that there will be enough bomb grade material produced for at least one weapon within several months. Syria has refused to allow international inspectors access to the facility.

The Joint Chiefs' report to the President does not recommend a specific course of action. However, it concludes that "because the Al Qaeda facility is comprised of a series of deeply buried bunkers, nuclear weapons would be more effective for destroying this target."

The report was leaked to the Associated Press by a high-ranking administration official involved in planning the strike. According to the official, the centrifuges and nuclear materials are too large to be moved without detection. A U.S. intelligence official states that he has high confidence that Al Qaeda is within months of producing an operational nuclear bomb. After that, the official said, "all bets are off."

Target: Al Qaeda Nuclear Lab		
	U.S. Nuclear Strike	U.S. Conventional Strike
Probability of Success	90%	70%
Estimated Syrian Civilian Deaths	1,000	100

Chart from Joint Chiefs' report describing nuclear and conventional options for strike on Al Qaeda nuclear lab.

According to Dr. David Wright, a nuclear weapons expert at the Union of Concerned Scientists, an independent think-tank based in Washington, D.C., "If a bomb of this size exploded in New York City, it could easily kill 50,000 to 70,000 people."

The report states that despite the remote location of the Al Qaeda facility, the destructive power of nuclear weapons would result in significantly more Syrian civilian fatalities than the conventional option. Military planners estimate 100 civilian deaths from a conventional strike, compared with 1,000 or more from a nuclear attack. Moreover, in addition to destroying much of the city, radiation from a nuclear strike could have negative health consequences for the local populace and would make the surrounding area uninhabitable for a year or more.

Nuclear option could kill 10 times as many civilians as the conventional strike, cause widespread environmental damage

Given the collateral damage expected from the nuclear option, some military and diplomatic officials fear that a nuclear strike could provoke condemnation from some U.S. partners and allies.

Neither strike option would rely on U.S. ground forces. For this reason, the report concludes that "no U.S. military personnel are at risk in either operation."

Figure A.7: PSV, Equal Probability of Success

Joint Chiefs Report Concludes Nuclear and Conventional Options for Destroying Al Qaeda Nuke Lab Equally Effective

Expected Civilian Casualties, Physical Destruction Equivalent for Both Options

The Associated Press

A report from Admiral Mike Mullen, Chairman of the Joint Chiefs of Staff, to the President concludes that military strikes using nuclear or conventional weapons would be "equally effective" in destroying an Al Qaeda nuclear weapons facility in Syria.

The report compares two American military options, a conventional strike using nearly one hundred conventionally-armed cruise missiles, and an attack using two small, nuclear-armed cruise missiles. The report estimates that both options have a 90 percent chance of successfully destroying the Al Qaeda nuclear weapons lab.

The Joint Chiefs' assessment comes two weeks after Russian intelligence agents intercepted a shipment of centrifuges and low-enriched uranium which could be used to produce nuclear weapons. The bomb-making equipment was being smuggled out of Russia to an Al Qaeda facility located near the remote town of As-Safih in northern Syria.

The suspects in the smuggling operation were employed at a Russian nuclear lab. The smugglers confirmed under questioning that other shipments of centrifuges and low-enriched uranium had already been delivered to the Al Qaeda base, where the centrifuges are being used to make fuel for a nuclear bomb. The smugglers stated that there will be enough bomb grade material produced for at least one weapon within two weeks. Syria has refused to allow international inspectors access to the facility.

> "Conventional and nuclear options would be equally effective against the buried Al Qaeda nuclear weapons base."

The Joint Chiefs' report to the President does not recommend a specific course of action. However, it concludes that "because the Al Qaeda facility is comprised of a series of deeply buried bunkers, a strike would require either large numbers of conventional missiles, or two nuclear weapons, to destroy the facility." Either option would have roughly a ninety percent chance of success, according to the report.

The report was leaked to the Associated Press by a high-ranking administration official involved in planning the strike. According to the official, the centrifuges and nuclear materials are too large to be moved without detection. A US intelligence official stated that he has high confidence that al Qaeda is within two weeks of producing an operational bomb. After that, the official said, "all bets are off."

According to Dr. David Wright, a nuclear weapons expert at the Union of Concerned Scientists, an independent think-tank based in Washington, D.C., "If a bomb of this size exploded in New York City, it could easily kill 50,000 to 70,000 people."

The report states that the remote location of the Al Qaeda facility should limit Syrian civilian fatalities for either option. Because many conventional weapons would be required to destroy the Al Qaeda base, the report estimates that "the two options would kill approximately the same number of Syrian civilians" – about 1,000, including immediate deaths and long term consequences of the conventional or nuclear strike. As both options will rely on cruise missiles launched from U.S. naval vessels, the report concludes that "no U.S. military personnel are at risk in either operation."

TARGET: AL QAEDA NUCLEAR WEAPONS LAB		
	U.S. NUCLEAR STRIKE	U.S. CONVENTIONAL STRIKE
PROBABILITY OF SUCCESS	90%	90%
ESTIMATED SYRIAN CIVILIAN DEATHS	1,000	1,000

IF U.S. STRIKE FAILS: 50,000 - 70,000 U.S. CIVILIAN FATALITIES

Chart from Joint Chiefs' report describing nuclear and conventional options for strike on Al Qaeda nuclear lab.

Figure A.8: PSV, Nuclear Higher Probability of Success

Al Qaeda Building Atomic Bombs in Syria: Joint Chiefs Say U.S. Nuclear Options Only Provide Small Increase in Chances Of Destroying Nuke Lab

Chiefs Conclude Nuclear Option Has 90% Chance of Success, Conventional 70%

The Associated Press

A report from Admiral Mike Mullen, Chairman of the Joint Chiefs of Staff, to the President concludes that nuclear weapons would be "moderately more effective" than conventional strikes in destroying an Al Qaeda nuclear weapons facility in Syria.

The report compares two American military options, a conventional strike using nearly one hundred conventionally-armed cruise missiles, and an attack using two small nuclear-armed cruise missiles. The report estimates that the conventional strike has a 70 percent chance of successfully destroying the atomic bomb lab while nuclear weapons increase the chances of success to approximately 90 percent.

The Joint Chiefs' assessment comes two weeks after Russian intelligence agents intercepted a shipment of centrifuges and low-enriched uranium that could be used to produce nuclear weapons. The bomb-making equipment was being smuggled out of Russia to an Al Qaeda facility located near the remote town of As-Safih in northern Syria.

The suspects in the smuggling operation were employed at a Russian nuclear lab. The smugglers confirmed under questioning that other shipments of centrifuges and low-enriched uranium had already been delivered to the Al Qaeda base, where the centrifuges are being used to make fuel for a nuclear bomb. The smugglers stated that there will be enough bomb grade material produced for at least one weapon within two weeks. Syria has refused to allow international inspectors access to the facility.

> "Nuclear weapons would be moderately more effective against this deeply buried target."

The Joint Chiefs' report to the President does not recommend a specific course of action. However, it concludes that "because the Al Qaeda facility is comprised of a series of deeply buried bunkers, nuclear weapons would be more effective for destroying this target."

The report was leaked to Associated Press by a high-ranking administration official involved in planning the strike. According to the official, the centrifuges and nuclear materials are too large to be moved without detection. A US Intelligence official stated that he has high confidence that Al Qaeda is within two weeks of producing an operational bomb. After that, the official said, "all bets are off."

According to Dr. David Wright, a nuclear weapons expert at the Union of Concerned Scientists, an independent think-tank based in Washington, D.C., "If a bomb of this size exploded in New York City, it could easily kill 50,000 to 70,000 people."

The report states that the remote location of the Al Qaeda facility should limit Syrian civilian fatalities. Because many conventional weapons would be required to destroy the Al Qaeda base, the Joint Chiefs estimate that "the nuclear and conventional options would kill approximately the same number of Syrian civilians" – about 1,000, including immediate deaths and long term consequences of the conventional or nuclear strike. As both options will rely on cruise missiles launched from U.S. naval vessels, the report concludes that "no U.S. military personnel are at risk in either operation."

TARGET: AL QAEDA NUCLEAR WEAPONS LAB		
	U.S. NUCLEAR STRIKE	U.S. CONVENTIONAL STRIKE
PROBABILITY OF SUCCESS	90%	70%
ESTIMATED SYRIAN CIVILIAN DEATHS	1,000	1,000

If U.S. Strike Fails: 50,000 - 70,000 U.S. Civilian Fatalities

Chart from Joint Chiefs' report describing nuclear and conventional options for strike on Al Qaeda nuclear lab.

A.3 Outcome Questions

Below we provide, verbatim, the questions that we asked subjects in Study 1 and Study 2. For ease of comparison, the survey experiment questions are near-identical to those used by Press and colleagues.

Study 1, Survey Experiment

1. Demographic questions (pre-vignette)
2. Given the facts described in the article, if the United States decided to conduct a nuclear strike to destroy the Al Qaeda base, how much would you approve or disapprove of the U.S. military action? (Strongly disapprove, disapprove, somewhat disapprove, somewhat approve, approve, strongly approve)
3. Given the facts described in the article, if the United States decided to conduct a conventional strike to destroy the Al Qaeda base, how much would you approve or disapprove of the U.S. military action? (Strongly disapprove, disapprove, somewhat disapprove, somewhat approve, approve, strongly approve)
4. If you had to choose between one of the two U.S. military options described in the article, would you prefer the nuclear strike or the conventional strike? (Strongly prefer the conventional strike, somewhat prefer the conventional strike, somewhat prefer the nuclear strike, strongly prefer the nuclear strike)
5. You said you preferred a conventional (nuclear) strike by the United States. In a sentence or two, please say why you preferred a conventional (nuclear) strike.
6. Regardless of which option you preferred, how ethical or unethical do you think it would be if the United States decided to use nuclear weapons in this situation (Highly ethical, ethical, somewhat ethical, somewhat unethical, unethical, highly unethical)

Study 1, Conjoint

On the transition page between last survey experiment question and the conjoint tasks, respondents saw the following text:

"Now imagine a scenario similar to the one described in the news article. Again, an Al Qaeda cell is operating a nuclear weapons lab in a remote town in Syria, and is developing a weapon that could be used against American civilians. However, the strike options available are different from those indicated in the article.

"Over the next five questions, you will be asked to choose between two strike options. In each case, you will be informed about the characteristics of each strike along several dimensions."

For each conjoint task, subjects saw the strike comparisons and the following text: "Please carefully review the options detailed below, then indicate which of the two strikes you prefer. Which of these strike options do you prefer?"

Study 2, Survey Experiment

1. Demographic questions (pre-vignette)

2. Given the facts described in the article, if the United States decided to conduct a nuclear strike to destroy the Al Qaeda base, how much would you approve or disapprove of the U.S. military action? (Strongly disapprove, disapprove, somewhat disapprove, somewhat approve, approve, strongly approve)

3. Given the facts described in the article, if the United States decided to conduct a conventional strike to destroy the Al Qaeda base, how much would you approve or disapprove of the U.S. military action? (Strongly disapprove, disapprove, somewhat disapprove, somewhat approve, approve, strongly approve)

4. If you had to choose between one of the two U.S. military options described in the article, would you prefer the nuclear strike or the conventional strike? (Strongly prefer the conventional strike, somewhat prefer the conventional strike, somewhat prefer the nuclear strike, strongly prefer the nuclear strike)

5. You said you preferred a conventional (nuclear) strike by the United States. In a sentence or two, please say why you preferred a conventional (nuclear) strike.

6. Regardless of which strike option you preferred, how realistic did you find the scenario described in the article? (Not very realistic, somewhat realistic, very realistic)

Note: We randomized whether subjects were asked about their approval or their preference first (i.e., whether subjects saw questions 1 and 2 above before question 3 or whether they saw question 3 first followed by questions 1 and 2.)

Study 2, Choice Experiment

On the transition page between last survey experiment question and the conjoint tasks, respondents saw the following text:

"The last set of questions asks you to choose between a series of military strike options.

"Imagine a situation similar to the one you read about before. Al Qaeda is operating a nuclear weapons lab in Syria and is developing a weapon that could eventually be used against U.S. civilians. The President has decided to attack the lab and the Joint Chiefs have presented two possible options. We want to know which option you think would be a better choice

"There will be twelve total choices. On each page, the 'next' button will appear after 15 seconds."

Subjects then saw two strike options, with randomly varied features as described in the main text of the article, and indicated their preferences.

B Supporting Tables

To support the tables and figures in the main text, this section presents the following:

- Table B.1 presents the estimates plotted in Figure 3.
- Table B.3 shows that the regression analysis of the choice experiment, presented in Table 3, is robust to the inclusion of controls for the respondent's vignette experiment treatment assignment.
- Table B.4 shows that in the same analysis, the respondent's vignette experiment treatment assignment did not have a statistically significant effect on any of the parameter estimates.
- Table B.5 presents the estimates plotted in Figure 4.
- Table B.2 presents the estimates plotted in Figure 5.

Table B.1: Estimates plotted in Figure 3.

Side effects	Scenario	Estimate	s.e.	95% CI
Denatured	+0% chance	0.186	0.014	(0.158, 0.214)
	+20% chance	0.496	0.018	(0.461, 0.531)
Realistic	+0% chance	0.168	0.014	(0.141, 0.195)
	+20% chance	0.238	0.016	(0.207, 0.270)
Denatured	Fewer casualties	0.591	0.018	(0.557, 0.626)
	Same casualties	0.186	0.014	(0.158, 0.214)
Realistic	Fewer casualties	0.333	0.017	(0.300, 0.365)
	Same casualties	0.168	0.014	(0.141, 0.195)

Table B.2: Estimates plotted in Figure 5.

Dataset	Destruction	Effectiveness	Estimate	s.e.	95% CI
Aronow et al.	Denatured	+0%	0.112	0.021	(0.071, 0.153)
		+20%	0.545	0.033	(0.481, 0.609)
Press et al.	Denatured	+0%	0.189	0.033	(0.125, 0.254)
		+20%	0.514	0.049	(0.417, 0.611)
Original (Study 1)	Realistic	+0%	0.138	0.022	(0.095, 0.180)
		+20%	0.124	0.021	(0.084, 0.165)
Original (Study 2)	Realistic	+0%	0.100	0.017	(0.065, 0.134)
		+20%	0.195	0.025	(0.145, 0.245)
	Denatured	+0%	0.184	0.023	(0.138, 0.229)
		+20%	0.328	0.031	(0.267, 0.388)
Pooled	Realistic	+0%	0.111	0.014	(0.084, 0.138)
		+20%	0.171	0.018	(0.136, 0.207)
	Denatured	+0%	0.155	0.014	(0.128, 0.183)
		+20%	0.438	0.021	(0.397, 0.479)

Table B.3: Robustness check on Table 3: controls for vignette experiment treatment status.

	No controls	Controls
α_0 Constant	0.221	0.275
	(0.023)	(0.035)
δ_0 Disadvantages (0-3 scale)	−0.021	−0.026
	(0.008)	(0.006)
α_M Fewer military casualties	0.284	0.279
	(0.021)	(0.014)
α_S Better chance of success	0.184	0.165
	(0.020)	(0.013)
δ_M Disadvantages × fewer mil. casualties	−0.039	−0.039
	(0.010)	(0.007)
δ_S Disadvantages × better chance	−0.044	−0.035
	(0.010)	(0.007)
Better chance of success	0.039	0.004
	(0.029)	(0.019)
Equal destruction	−0.037	−0.026
	(0.026)	(0.017)
Better chance × equal destruct.	−0.011	0.009
	(0.040)	(0.026)
Adj. R^2	0.099	0.124
Num. obs.	12154	12136
N Clusters	2054	2051

Note: Table presents OLS estimates of the parameters in (1), with the addition of controls for the respondent's treatment status in the vignette experiment. Standard errors clustered by respondent.

Table B.4: Robustness check on Table 3: test for treatment effects on each parameter.

	No controls	Controls
α_0 Constant	0.194	0.256
	(0.031)	(0.039)
. . . × $(d = 0, s = 1)$	0.124	0.036
	(0.053)	(0.032)
. . . × $(d = 1, s = 0)$	−0.050	−0.030
	(0.039)	(0.031)
. . . × $(d = 1, s = 1)$	0.023	0.029
	(0.044)	(0.032)
δ_0 Disadvantages (0-3 scale)	−0.011	−0.019
	(0.014)	(0.011)
. . . × $(d = 0, s = 1)$	−0.030	−0.010
	(0.024)	(0.016)
. . . × $(d = 1, s = 0)$	0.001	−0.004
	(0.019)	(0.016)
. . . × $(d = 1, s = 1)$	−0.007	−0.016
	(0.021)	(0.016)
α_M Fewer military casualties	0.308	0.281
	(0.040)	(0.028)
. . . × $(d = 0, s = 1)$	−0.071	−0.011
	(0.061)	(0.041)
. . . × $(d = 1, s = 0)$	0.007	0.031
	(0.058)	(0.040)
. . . × $(d = 1, s = 1)$	−0.025	−0.029
	(0.055)	(0.040)
α_S Better chance of success	0.220	0.169
	(0.044)	(0.027)
. . . × $(d = 0, s = 1)$	−0.097	−0.016
	(0.061)	(0.038)
. . . × $(d = 1, s = 0)$	−0.019	0.008
	(0.058)	(0.038)
. . . × $(d = 1, s = 1)$	−0.021	−0.010
	(0.058)	(0.038)
δ_M Disadvantages × fewer mil. casualties	−0.050	−0.034
	(0.020)	(0.015)
. . . × $(d = 0, s = 1)$	0.007	−0.015
	(0.029)	(0.020)
. . . × $(d = 1, s = 0)$	0.024	−0.004
	(0.029)	(0.020)
. . . × $(d = 1, s = 1)$	0.010	0.003
	(0.028)	(0.020)
δ_S Disadvantages × better chance	−0.057	−0.036
	(0.022)	(0.014)
. . . × $(d = 0, s = 1)$	0.052	0.011
	(0.031)	(0.019)
. . . × $(d = 1, s = 0)$	−0.001	−0.008
	(0.029)	(0.019)
. . . × $(d = 1, s = 1)$	−0.007	0.000
	(0.029)	(0.019)
Adj. R^2	0.101	0.124
Num. obs.	12154	12136
N Clusters	2054	2051

Note: Table presents OLS estimates of the parameters in (1), with the addition of interactions between each parameter and the subject's treatment status in the vignette experiment. Standard errors clustered by respondent.

Table B.5: Estimates plotted in Figure 4.

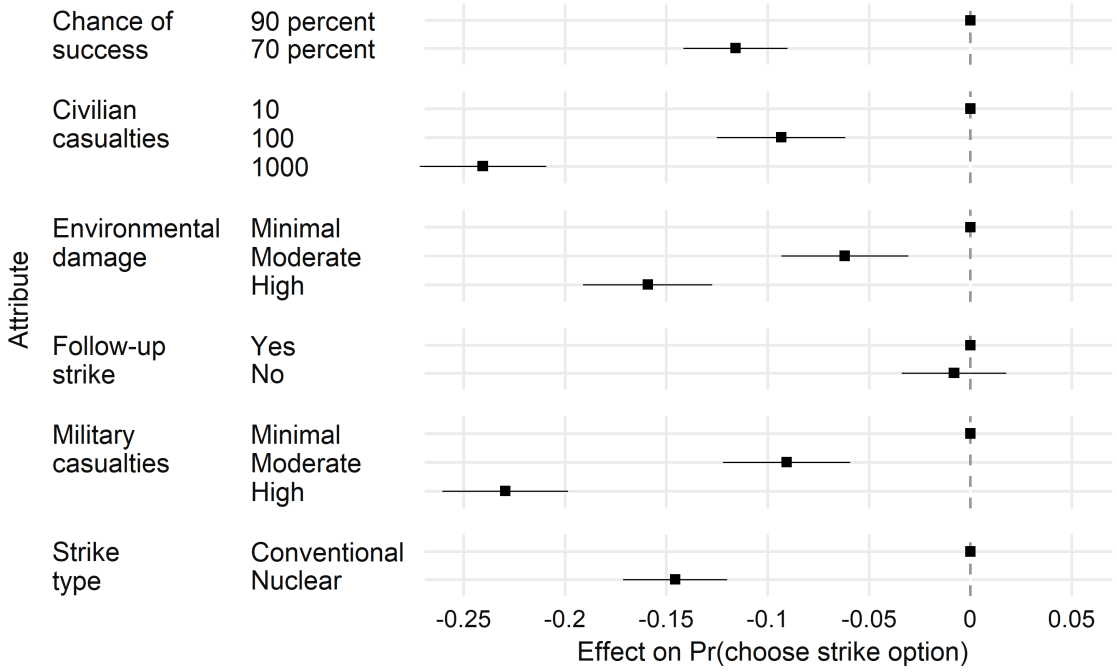
Study	Choice	Net adv.	Estimate	s.e.	95% CI	N
Study 1	Conventional vs.	-4	-0.000	0.000	(-0.000, 0.000)	12
	Conventional	-3	0.052	0.029	(-0.007, 0.111)	58
		-2	0.172	0.033	(0.107, 0.238)	151
		-1	0.273	0.028	(0.218, 0.327)	253
		0	0.496	0.004	(0.489, 0.503)	282
		1	0.723	0.028	(0.669, 0.778)	253
		2	0.828	0.033	(0.762, 0.893)	151
		3	0.948	0.029	(0.889, 1.007)	58
		4	1.000	0.000	(1.000, 1.000)	12
	Nuclear vs.	-4	0.083	0.083	(-0.100, 0.267)	12
	Conventional	-3	0.091	0.046	(-0.002, 0.183)	55
		-2	0.140	0.027	(0.086, 0.194)	164
		-1	0.214	0.027	(0.161, 0.267)	248
		0	0.300	0.026	(0.249, 0.350)	307
		1	0.472	0.033	(0.408, 0.537)	254
		2	0.598	0.038	(0.522, 0.673)	169
		3	0.771	0.054	(0.663, 0.880)	70
		4	0.800	0.109	(0.563, 1.037)	15
Study 2	Conventional vs.	-5	-0.000	0.000	(-0.000, 0.000)	9
	Conventional	-4	0.130	0.032	(0.068, 0.193)	120
		-3	0.136	0.020	(0.097, 0.175)	339
		-2	0.215	0.015	(0.185, 0.245)	792
		-1	0.319	0.014	(0.292, 0.346)	1248
		0	0.500	0.000	(0.500, 0.500)	1422
		1	0.681	0.014	(0.654, 0.708)	1248
		2	0.785	0.015	(0.755, 0.815)	792
		3	0.864	0.020	(0.825, 0.903)	339
		4	0.870	0.032	(0.807, 0.932)	120
		5	1.000	0.000	(1.000, 1.000)	9
	Nuclear vs.	-5	0.083	0.079	(-0.096, 0.262)	12
	Conventional	-4	0.089	0.027	(0.035, 0.143)	119
		-3	0.119	0.018	(0.083, 0.154)	360
		-2	0.152	0.014	(0.125, 0.179)	801
		-1	0.235	0.012	(0.211, 0.260)	1321
		0	0.344	0.013	(0.318, 0.370)	1476
		1	0.463	0.016	(0.433, 0.494)	1234
		2	0.549	0.019	(0.512, 0.587)	818
		3	0.633	0.027	(0.579, 0.686)	366
		4	0.733	0.048	(0.639, 0.828)	98
		5	0.929	0.071	(0.774, 1.083)	14

C Supplemental Results

C.1 Average Marginal Component Effects

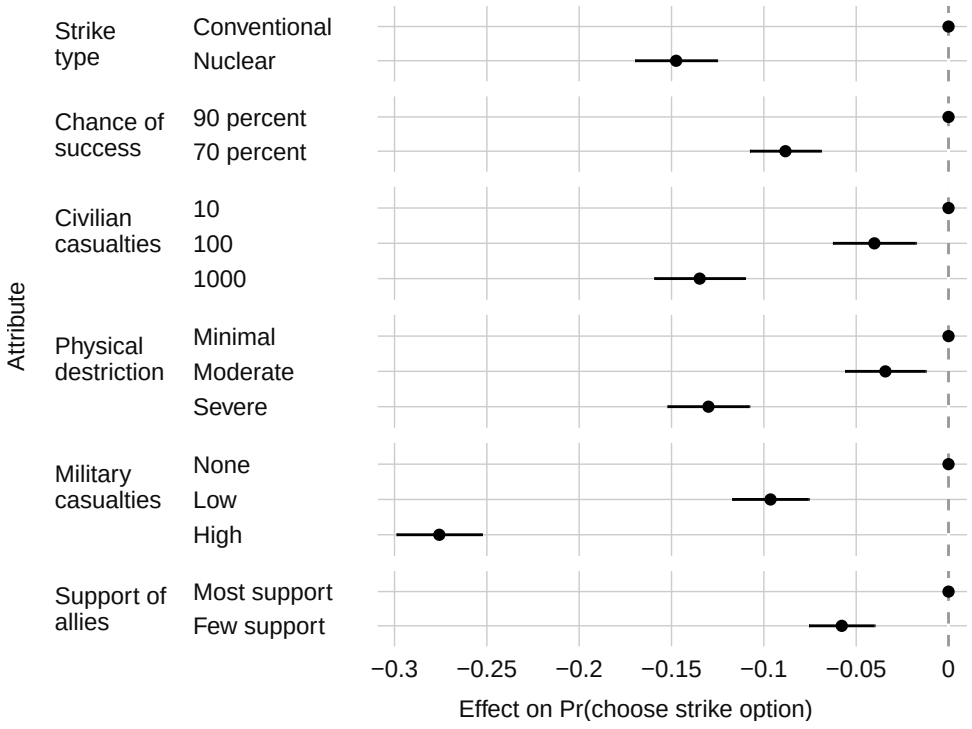
Our fully randomized choice experiments can also be used to calculate average marginal component effects (AMCE), which may be familiar to readers of recent work on choice experiments (e.g., Hainmueller et al. 2015). This framework has the advantage of clearly presenting how much each attribute matters on average, at the expense of detecting the conditional effects we spotlighted in the main text. Figure C.1 plots AMCE estimates for Study 1, and Figure C.2 plots them for Study 2.

Figure C.1: Average Marginal Component Effect Estimates (Study 1).



Note: This figure plots the average marginal component effect of each attribute in Study 1's fully randomized choice experiment. Each dot is a coefficient estimate from the model $Y_{ij} = \mathbf{X}\beta + \epsilon_{ij}$, where X is a matrix of indicator variables and β is a vector of regression coefficients. Horizontal bars represent 95 percent confidence intervals calculated using cluster-robust standard errors. Dots without confidence intervals indicate the baseline category.

Figure C.2: Average Marginal Component Effect Estimates (Study 2).



Note: This figure plots the average marginal component effect of each attribute in Study 2's fully randomized choice experiment. Each dot is a coefficient estimate from the model $Y_{ij} = \mathbf{X}\beta + \epsilon_{ij}$, where X is a matrix of indicator variables and β is a vector of regression coefficients. Horizontal bars represent 95 percent confidence intervals calculated using cluster-robust standard errors. Dots without confidence intervals indicate the baseline category.

C.2 Restricted Choice Experiment

In the main text, we analyze the restricted choice experiment by visualizing a subset of the results (Figure 3) and with regression analysis (Table 3). Here, we supplement this analysis by visualizing a broader set of the results.

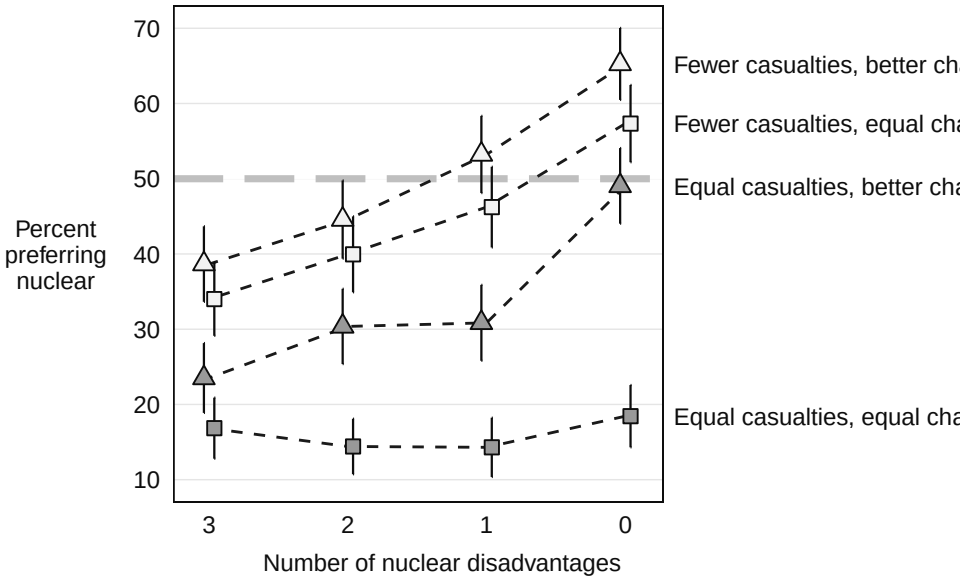
The restricted choice experiment allows a look at sixteen distinct scenarios: between 0 and 3 disadvantages for nuclear weapons, as well as two possible advantages. For each of these sixteen distinct cells, Figure C.3 presents mean support for nuclear strikes over a conventional alternative.

The left side of the figure shows preferences for nuclear use when the disadvantages of nuclear weapons are many. Here, we can test for our prediction of an illusory taboo: a majority of people should oppose nuclear use, and this resistance will be inflexible to variation that assigns the nuclear option greater military utility, such as a greater chance of success or fewer U.S. military casualties. This prediction is borne out. While preference for nuclear strikes is not completely inflexible, aversion remains strong: in all scenarios on the far left-hand side of the graph, solid majorities oppose the use of nuclear weapons. Even when the nuclear strike offers a 20 percent greater chance of success against a perilous threat and the prospect of reducing the number of U.S. military casualties, it is opposed by more than 60 percent of respondents.

The restricted choice experiment also allows us to examine how the same respondents react in scenarios in which nuclear weapons are not ascribed their usual disadvantages of more civilian casualties, greater physical destruction, and the disapproval of allies. Moving from the lefthand side to the righthand side of Figure C.3 presents a clear test of our interaction effect hypothesis. The results are again consistent with our framework. When nuclear strikes are denatured, the military advantages are sufficient to bring about majority support.

Table C.1 displays the estimates that are plotted in Figure C.3. Some of these estimates are reported in the main text as validation of the predicted values from the regression analysis.

Figure C.3: Support for nuclear strikes by advantages and number of disadvantages.



Note: Based on the restricted randomization choice experiment, this figure presents a non-parametric estimate of the relationships implied by Table 3. The y-axis plots the percentage of respondents preferring a nuclear strike and the x-axis plots the disadvantage index. The connected sets of points all have the same military advantages, as indicated by the text to the right.

Table C.1: Group means, restricted choice experiment, Study 2

Advantages	Disadvantages	Estimate	S.E.	CI
Equal military casualties,	3	0.24	0.02	(0.19, 0.28)
Better chance of success	2	0.30	0.03	(0.25, 0.35)
	1	0.31	0.03	(0.26, 0.36)
	0	0.49	0.03	(0.44, 0.54)
Equal military casualties,	3	0.17	0.02	(0.13, 0.21)
Equal chance of success	2	0.14	0.02	(0.11, 0.18)
	1	0.14	0.02	(0.1, 0.18)
	0	0.18	0.02	(0.14, 0.23)
Fewer military casualties,	3	0.39	0.03	(0.34, 0.44)
Better chance of success	2	0.45	0.03	(0.39, 0.5)
	1	0.53	0.03	(0.48, 0.58)
	0	0.65	0.02	(0.6, 0.7)
Fewer military casualties,	3	0.34	0.02	(0.29, 0.39)
Equal chance of success	2	0.40	0.03	(0.35, 0.45)
	1	0.46	0.03	(0.41, 0.52)
	0	0.57	0.03	(0.52, 0.62)

C.3 Secondary Outcomes in Vignette Experiment

Figure C.4: Group means for secondary outcome variables, Study 1 vignette experiment

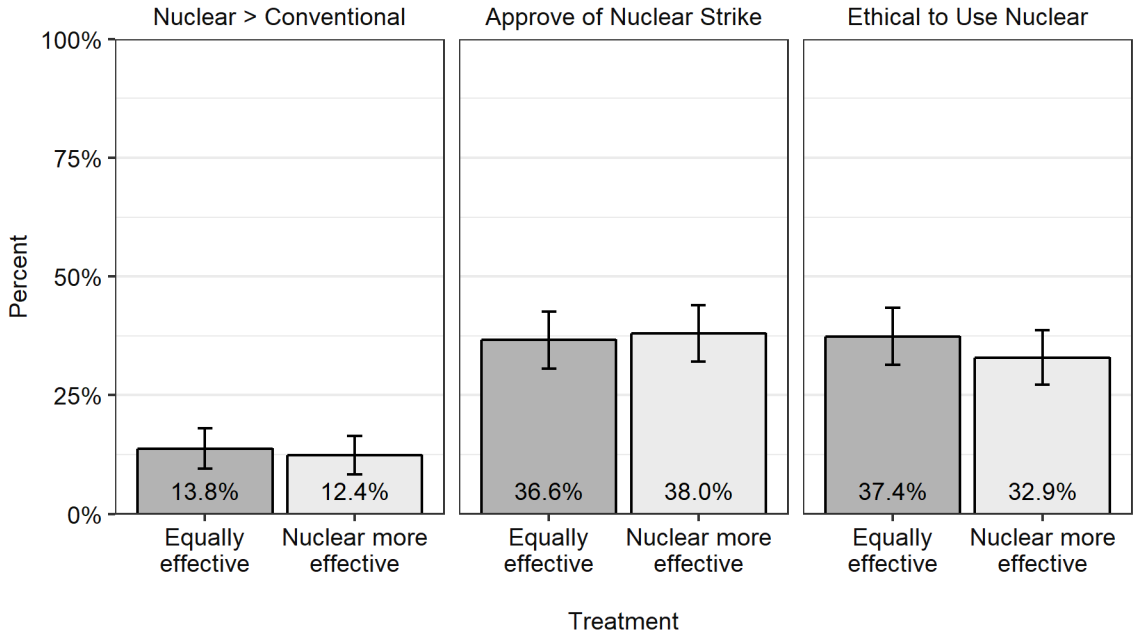


Table C.2: Average treatment effect on secondary outcome variables, Study 2 vignette experiment.

		Approve nuclear		Approve convent.		Common	
Term	Controls?	No	Yes	No	Yes	No	Yes
α Constant		0.511**	0.698**	0.692**	0.655**	0.567**	0.578**
		(0.022)	(0.073)	(0.017)	(0.054)	(0.021)	(0.056)
β_1 More destructive		−0.133**	−0.120**	0.021	0.014	0.058	0.054
		(0.031)	(0.030)	(0.026)	(0.024)	(0.030)	(0.030)
β_2 Better chance of success		0.061	0.045	−0.008	−0.029	−0.008	−0.030
		(0.032)	(0.031)	(0.025)	(0.023)	(0.029)	(0.029)
β_3 More destruct × better chance		0.013	0.007	0.006	0.018	−0.027	−0.011
		(0.045)	(0.043)	(0.036)	(0.034)	(0.042)	(0.043)
Adj. R^2		0.042	0.160	0.001	0.134	0.005	0.071
Num. obs.		2139	2136	2139	2136	2100	2097
RMSE		0.347	0.326	0.276	0.257	0.332	0.321

D Discrete Choice Model

The main text notes that the illusion of taboo theory was inspired in part by the implications of a standard model of discrete choice (Train 2003). This appendix describes such a model, explains why it is consistent with the explanation in the main text, and shows that it provides a good fit to our data.

The Model

Choices between military strikes are a function of the strikes' characteristics. Let X_{ijk} be an undifferentiated index of strike characteristics, including the military utility of a strike option (e.g., its chance of success) and its side effects (e.g., civilian casualties); we will distinguish between these characteristics below. To accommodate the idea of inherent or gut aversion to nuclear strikes, also let strikes be designated as nuclear ($N_{ij} = 1$) or conventional ($N_{ij} = 0$). Agent i's utility from strike j is

$$U_{ij} = \eta N_{ij} + \sum_k \beta_k X_{ijk} - \epsilon_{ij}. \tag{3}$$

In (6), η represents the level of inherent or gut aversion to nuclear strikes. By inherent aversion, we mean to capture the opposition to nuclear weapons themselves apart from their instrumental consequences. This could rise to the level of horror and disgust that Tannenwald perceived in people's attitudes toward nuclear weapons. Meanwhile, β is the amount of utility or disutility i receives from strike characteristic k. Finally, ϵ_{ij} represents idiosyncratic differences between agents.

Under this framework, i chooses strike option 1 over strike option 2 if $U_{i1} > U_{i2}$. Given the choice between two strikes, $j = 1$ and $j = 2$, i chooses 2 if:

$$\begin{aligned} U_{i1} &< U_{i2} \\ \sum_k \beta_k (X_{i1k} - X_{i2k}) + \eta(N_{i1} - N_{i2}) &< \epsilon_{i1} - \epsilon_{i2}. \end{aligned} \tag{4}$$

To simplify the presentation of the results while maintaining the core intuition, we can also constrain all β_k to be equal, giving a restricted version of the model,

$$\beta \sum_k (X_{i1k} - X_{i2k}) + \eta(N_{i1} - N_{i2}) < \epsilon_{i1} - \epsilon_{i2}. \tag{5}$$

To estimate the model and generate observable predictions from it, we follow the literature on discrete choice and assume that ϵ_{ij} follows a Type I extreme value distribution, which allows the model parameters to be estimated using logistic regression (Train 2003). The precise choice of distribution does not matter much; many sigmoid distributions bound choice probabilities between 0 and 1 and take approximately the same shape. In the main text, we displayed this model's predictions as Figure 2, with all parameter values set equal

to 1.

The predictions generated by the discrete choice model reflect the same property of human decision-making that we explained in the main text: choice attributes matter more when they are close-to-pivotal than when most factors are stacked in favor of one option or another. Consequently, the parametric assumptions that go into discrete choice models tend to provide an excellent fit to the data (for studies of this in the consumer choice literature, see Andersson and Uboe 2010; Larsen et al. 2012). Graham and Svolik (2020) show a strong correspondence between the model's predictions and a non-parametric analysis of candidate choice scenarios.

Though researchers sometimes treat parametric assumptions as a matter of convenience, in the case of the discrete choice model, the parametric assumptions are well-founded. The standard assumptions about the distribution of ϵ_{ij} embody intuitive truths about human decision-making that are evident in raw data in a wide range of contexts. In our case, we drew on this model's success in explaining preferences in other contexts to generate predictions for how people would form their preferences in choices between nuclear and conventional strikes.

In this way, the intuition we provided in the main text is embedded a simple, standard framework for examining an agent's choice between two alternatives. Just as in choices between consumer products and political candidates, one should expect the marginal effect of the attributes of nuclear and conventional strikes to be conditional on the surrounding aspects of the choice.

Model-Based Estimates

To provide evidence that the discrete choice model offers a good approximation for our respondents' actual choice behavior, we began by estimating the parameters in (6), and (5). Table D.1 displays the results. In Study 1, respondents placed the highest value on avoiding civilian casualties, followed by avoiding U.S. military casualties and the "inherent" aversion to nuclear weapons that cannot be explained by other factors. In Study 2, respondents placed the highest value on preventing U.S. military casualties, followed by avoiding nuclear strikes and then by civilian casualties. In both studies, respondents saw a higher chance of success and lower environmental damage as roughly half to two-thirds as important as these leading concerns. Least important were the chance for a follow-up strike and the disapproval of allies.

We can check the alignment between our model and the respondents' actual choice behavior by using these parameter estimates to generate predictions for what should have been observed in our non-parametric analysis. The most straightforward opportunity to compare the model's predictions to the main text comes from Figure 4, which plots the percentage of respondents who prefer each strike option for the unrestricted choice experiments from both studies, separated by whether the choice pits a nuclear strike against a conventional strike or whether it pits two nuclear strikes.

Figure D.1 presents the results of this comparison. It duplicates Figure 4, with predictions

Table D.1: Model estimates.

(a) Study 1, unrestricted model.

Parameter		Estimate (S.E.)
η	Nuclear	-0.78 (0.08)
β_1	Chance of success	0.59 (0.07)
β_2	Prevents casualties	0.81 (0.07)
β_3	Follow-up strike	0.06 (0.07)
β_4	Civilian casualties	-0.87 (0.07)
β_5	Environmental damage	-0.58 (0.06)

(b) Study 2, unrestricted model.

Parameter		Estimate (S.E.)
η	Nuclear	-0.74 (0.04)
β_1	Chance of success	0.46 (0.03)
β_2	Prevents casualties	0.95 (0.03)
β_3	Allies disapprove	-0.29 (0.03)
β_4	Civilian casualties	-0.50 (0.03)
β_5	Environmental damage	-0.48 (0.03)

(c) Study 1, restricted model.

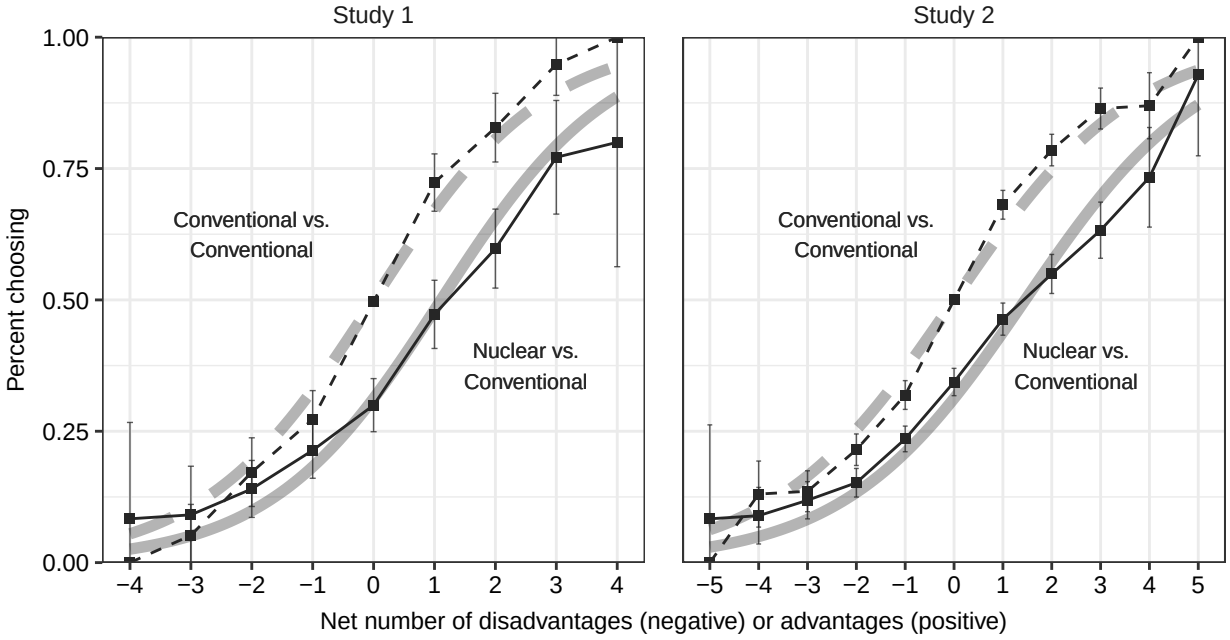
Parameter		Estimate (S.E.)
η	Nuclear	-0.79 (0.08)
β	Net advantages	0.71 (0.04)

(d) Study 2, restricted model.

Parameter		Estimate (S.E.)
η	Nuclear	-0.71 (0.04)
β	Net advantages	0.54 (0.02)

from (5) overlaid as thick, semi-transparent lines. We observe a close match between the model's predictions and the non-parametric results we presented in the main text, in terms of both the slopes of the lines and the difference between the nuclear/conventional and the conventional/conventional lines.

Figure D.1: Figure 4 with parametric estimates overlaid.



E Pre-Analysis Plan

This section presents the text of our pre-analysis plan. This document can also be found at [LINK TO AUTHOR-IDENTIFYING DOCUMENT REMOVED].

The purpose of this document is to offer a pre-analysis plan describing our theoretical goals, hypotheses, design, and analysis prior to fielding a survey experiment on public attitudes toward the use of nuclear weapons. The basic approach is as follows: We present subjects with a hypothetical scenario that calls for military strikes, and have them choose between two options that randomly vary in their attributes. One of those attributes is whether a strike is nuclear or conventional. But we also vary, in a survey and in two versions of a choice experiment, other attributes so that we can better understand how preferences for nuclear use are conditioned by contextual factors. Using this approach, we hope to map a broader range of preferences than has been considered in existing work.

Below, we describe in further detail the components of our project, our hypotheses, the design of the survey and conjoint, and analysis we plan to conduct. We also note secondary hypotheses at the end. Further details can be found in the paper from our pilot study, which is attached to this document. Our eventual manuscript will adopt a similar theoretical posture to these documents, but we reserve the right to update our thinking.

Theory of Nuclear Non-Use

Nuclear weapons have not been used in conflict since the bombings of Hiroshima and Nagasaki in 1945. One explanation for this apparent nuclear restraint is the "nuclear taboo" theory put forth by Tannenwald (1999, 2005, 2007). This theory says that decision-makers refrain from using nuclear weapons because of strong norms that frame their use as barbaric; using nuclear weapons is not something that a civilized state would do. Over time, nuclear restraint came to be unthinking, exhibiting a taken-for-granted quality. Another explanation for post-1945 nuclear restraint views the norm of non-use as a tradition rather than a taboo. A core difference between the tradition and taboo perspectives is that the former sees nuclear weapons use as subject to a rational and strategic calculation that is less prominent in the taboo story. For proponents of the tradition approach, the material consequences and reputational backlash associated with using nuclear weapons "self-deters" decision-makers from using "the bomb," but this outcome is reached by the conscious weighing of costs and benefits, not unthinkingly and as a result of constraints imposed by social norms (Paul 2009). Similarly, some researchers argue that non-use is due to a strategic phenomenon in which leaders of nuclear weapons states would rather not let the "nuclear genie" out of the bottle (Sagan 2004). Recently, experimental studies on the U.S. public indicate little resistance to

the use of nuclear weapons, especially when they offer advantages over conventional alternatives, suggesting that public attitudes may be quite permissive of nuclear use (Press et al. 2013; Sagan and Valentino 2017).

Each of these arguments puts forth a role for U.S. public opinion and finds empirical support for it. The taboo theory argues that the American public acts a constraint upon decision-makers in times of potential nuclear use. For example, President Dwight Eisenhower and Secretary of State John Foster Dulles thought that backlash from the U.S. public would be an obstacle to using nuclear weapons against China in the Taiwan Strait Crisis (Tannenwald 2007). The tradition theory argues that public opinion is generally opposed to the use of nuclear weapons but that U.S. citizens' attitudes are malleable to the context in which a nuclear strike takes place (Quester 2006). Press, Sagan, and Valentino argue that the public evinces little opposition to nuclear use, and that any aversion is due to strategic considerations rather than moral ones. They point to experimental evidence across two studies to buttress this claim (Press et al. 2013; Sagan and Valentino 2017).

To link the sometimes stark differences between these portrayals of the American public's attitudes toward nuclear weapons, we describe a theory of *conditional aversion* to the use of nuclear weapons. The conditional aversion theory holds that though the American public dislikes nuclear weapons, the apparent strength of this aversion depends heavily on the extent to which nuclear weapons are perceived as bringing about adverse consequences that would be less severe if conventional weapons were used to accomplish the same objective. We contrast conditional aversion with *inherent aversion*, which is a dislike of some action or thing so strong that it remains robust to that action gaining advantages over alternative options. Thus far, the literature on non-use has defined a taboo as a strong inherent aversion. However, our conditional aversion theory and the findings we plan to present questions that defintion. A weak affective or gut aversion could sustain a pattern of preferences similar to a taboo if the action is commonly linked to severe disadvantages. We argue that this is the case with nuclear use.

Our central predictions is that when nuclear weapons' disadvantages are large, the public's preferences are *observationally equivalent* to a taboo: weighed down by their perceived disadvantages, nuclear weapons receive little support at baseline and do not receive much additional support as a consequence of their potential advantages on the battlefield. When these disadvantages are framed away, we observe that preferences do not behave like a taboo: the public supports nuclear strikes at higher rates *and* is more easily persuaded to increase its support.

These two regularities—that both the support for nuclear weapons *and* the effect of battlefield advantages on changes in this support vary as a function of nuclear weapons' perceived drawbacks—are both predicted by a simple model of preferences over strike options. Suppose that strike option j may be nuclear ($N_j = 1$) or conventional ($N_j = 0$). Strikes vary according to several other characteristics as well, some of which are typically seen as possible advantages that a nuclear strike could have and others of which are typically seen as possible disadvantages that a nuclear weapon can have. Mathematically, the model is agnostic as to whether respondents will perceive the traits as advantages or disadvantages, but we have

strong expectations that are bolstered by the results to our initial study.

For simplicity suppose that all strike characteristics are binary, with X_{jk} taking a value of 1 when it is the better type and 0 when it is the worse type. Let respondent i's utility from strike j is:

$$U_{ij} = \eta N_{ij} + \sum_k \alpha_k A_{ijk} + \sum_l \beta_l B_{ijl} \tag{6}$$

where U_{ij} stands for total utility, α_k is the utility from advantage A_k, β_l is the utility from disadvantage B_l and η is the utility from a nuclear strike.

Given the choice between two strikes, $j = 1$ and $j = 2$, i chooses 2 if:

$$\begin{aligned} U_{i1} &< U_{i2} \\ \eta(N_{i1} - N_{i2}) + \sum_k \alpha_k(A_{i1k} - A_{i2k}) + \sum_l \beta_k(B_{i1l} - B_{i2l}) &< 0 \end{aligned} \tag{7}$$

For ease of exposition, we will often focus on a restricted version of this model in which we assume that all β_k take on the same value. This allows us to treat the disadvantages that nuclear weapons face as an additive index. In the restricted model, the respondent's choice is determined by the inequality:

$$\eta(N_{i1} - N_{i2}) + \sum_k \alpha_k(A_{i1k} - A_{i2k}) + \beta \sum_l (B_{i1l} - B_{i2l}) < 0 \tag{8}$$

where the only difference is that β is now a constant in the summation over k and can be pulled out, leaving $\sum_l (B_{i1l} - B_{i2l})$ to function as an additive index of disadvantages ranging from 0 to $-K$. In the main text, our figures will focus on the restricted version of the model in equation (10), but the paper and appendix will present estimates based on both versions of the model.

In our empirical estimates of the model, we will add a disturbance term ϵ_{ijk}. Assuming that this error term is distributed Type I extreme value allows us to estimate η, α_k, and β_l using logistic regression. To validate this assumption, our manuscript will compare non-parametric estimates of the probability of preferring a nuclear strike to predicted probabilities generated by the model.

Below, we combine the model with data from Study 1 to generate predictions for our empirical analysis of Study 2. First, we will briefly describe our research design.

Research Design

Our project will test this theory using a survey experimental design with the following components:

- A 2×2 survey experiment, using a mock news article vignette based on that used by Press et al. (2013).[7] Our 2×2 design varies the relative probabilities of success of the strike options (like Press and colleagues), as well as additional consequences of nuclear use, such as civilian casualties, environmental destruction, and possible international disapproval (unlike Press and colleagues).
- A choice experiment that asks subjects to consider a situation similar to that presented in our traditional survey experiment, with variation along five features of nuclear strikes.

In the survey flow, we will show the vignette first and the conjoint second. However, for the sake of clarity in explaining our theory, we may present the results of the conjoint first.

Survey Experiment

Our traditional survey experiment is a 2×2 extension of the prospective experiment presented in Press et al. (2013). In all conditions, respondents read a faux-news article describing a national security crisis involving the threat of nuclear terrorism. The article describes an al-Qaeda weapons lab near a remote town in Syria. The terrorist cell operating there is believed to be just months away from developing a nuclear weapon that could be used against the U.S. homeland. The Joint Chiefs of Staff has prepared for the president a report that describes two military options for destroying the al-Qaeda facility, one using conventional weapons and one using nuclear weapons. We manipulate the features of these strikes in two ways: (1) the relative effectiveness of the strike options and (2) their material consequences in terms of civilian casualties, environmental destruction, and international backlash. Variation along these two dimensions produces our 2×2 structure, and yields the following treatment conditions:

1. **Equal Effectiveness, Equal Destruction**
   - Nuclear strike has a 90% chance of success, kills an estimated 1,000 civilians, with limited physical damage and no mention of international backlash
   - Conventional strike has a 90% chance of success, kills an estimated 1,000 civilians, with limited physical damage and no mention of international backlash
2. **Equal Effectiveness, Nuclear More Destructive**
   - Nuclear strike has a 90% chance of success, kills an estimated 1,000 civilians, with considerable physical and environmental damage, and mention of possible international backlash
   - Conventional strike has a 70% chance of success, kills an estimated 100 civilians, with limited physical damage and no mention of international backlash

[7] Our vignette is based on that used in the prospective conditions of Press et al. (2013).

3. **Nuclear Advantage, Equal Destruction**

    - Nuclear strike has a 90% chance of success, kills an estimated 1,000 civilians, with limited physical damage and no mention of international backlash
    - Conventional strike has a 70% chance of success, kills an estimated 1,000 civilians, with limited physical damage and no mention of international backlash.

4. **Nuclear Advantage, Nuclear More Destruction:**

    - Nuclear strike has a 90% chance of success, kills an estimated 1,000 civilians, with considerable physical and environmental damage, and mention of possible international backlash
    - Conventional strike has a 70% chance of success, kills an estimated 1,000 civilians, with limited physical damage and no mention of international backlash

The vignettes for each of these conditions are submitted with this pre-registration document. There is also a fifth document that highlights the precise places of variation within our vignette.

After reading the vignette, each subject will be asked four structured response questions: how much they would approve of the conventional strike option, how much they would approve of the nuclear strike option, and which strike they would prefer.Finally, we will ask subjects to explain their strike preference in a sentence or two.

Conjoint/Choice Task

For our conjoint/choice task component, we prompt the subjects to imagine a scenario similar to the one that was described in the survey vignette that they have just read (described above). We then present them with two randomly-generated strike options and ask them to indicate which they prefer. Each respondent goes through 12 tasks, making 12 choices in total. Each strike has six characteristics:

1. type of strike (nuclear or conventional)
2. probability of destroying target (90 or 70 percent)
3. U.S. military casualties (high, low, or minimal)
4. civilian casualties (about 10, 100, or 1,000 civilian casualties)
5. environmental damage (minimal, moderate, or high)
6. views of U.S. allies (few approve or most approve of strike)

A conjoint/choice task is a valuable tool for analyzing the nature of opposition to nuclear use, since it allows us to completely de-bundle nuclear technology from other features of a military strike with which nuclear weapons might typically be associated. In half of the 12 tasks, we use unrestricted randomization to generate the strike characteristics, as would occur in a conjoint experiment. In this area, it is possible for nuclear weapons to cause less civilian casualties and environmental damage than conventional weapons. In the other half of the tasks, we restrict randomization to generate more 'realistic' nuclear strikes. These scenarios have the following restrictions:

- All strikes are nuclear versus conventional.
- The nuclear strike always has at least as large a probability of destroying the target.
- The nuclear strike never results in more military casualties.
- The nuclear strike kills at least as many civilians as the conventional strike.
- The nuclear strike always causes at least as much environmental damage.
- The nuclear strike never has greater approval among allies.

These restrictions accord with the typical advantages and disadvantages of nuclear strikes. Two of nuclear weapons' key potential advantages are that they may be more effective on the battlefield and save U.S. military lives. Three of their key disadvantages are that they are likely to kill more civilians, cause more environmental destruction, and have lower approval among allies. In the language of the model (as expressed in equation (7)), these realistic scenarios amount to forcing $\sum_l (B_{i1l} - B_{i2l})$ to range between $^-3$ and 0, and $(A_{i1k} - A_{i2k})$ to equal 0 or 1 for both k.

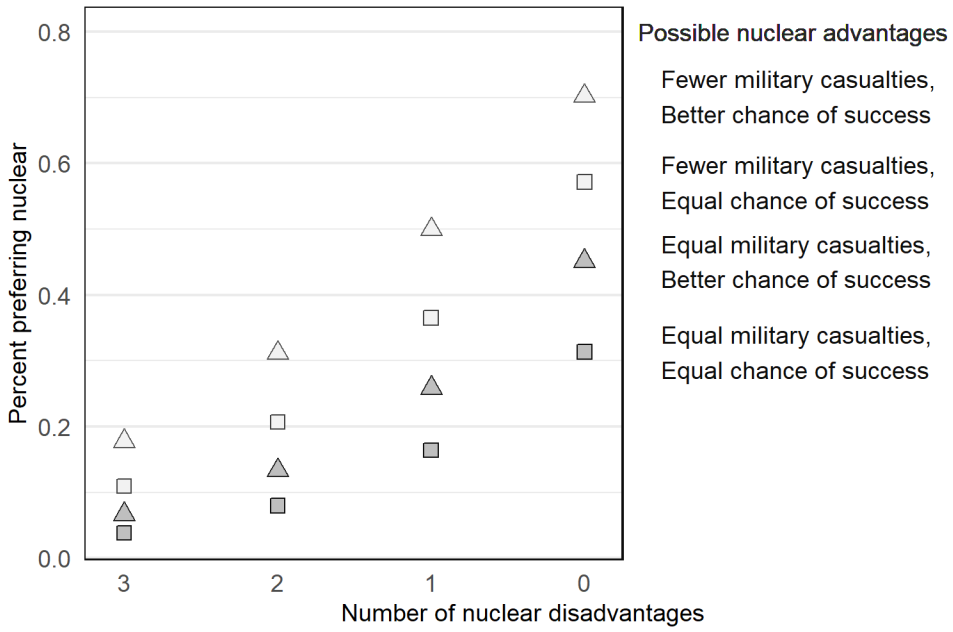
In total, this creates sixteen cells for the restricted randomization experiment, each one representing a combination of the four possible numbers of nuclear disadvantages $\{3, 2, 1, 0\}$ and the four possible combinations of advantages $\{(0,0), (0,1), (1,0), (1,1)\}$. Each respondent will make choices from six of these scenarios, drawn with equal probability and without replacement.

Hypotheses

Our primary interest is in testing the model's predictions in realistic scenarios. To make the predictions more concrete, we used data from Study 1's conjoint experiment to fit the unrestricted version of the model (from equation (7)), then generated predicted probabilities for each of the sixteen cells in the restricted randomization choice experiment. Figure E.1 displays these predictions. Our analysis of the choice experiment will feature a figure that looks something like this.

The data visualization captures the core predictions we wish to test: when nuclear weapons are coupled with their typical disadvantages, we will observe lower baseline support for their

Figure E.1: Predicted Results of Choice Task, Restricted Randomization



use and smaller treatment effects for increases in battlefield effectiveness. We will articulate these predictions as some version of the following hypotheses:

Hypothesis 1. Conditional aversion. More disadvantages for nuclear weapons will lead to lower levels of baseline (control group) support and less increases in support due to nuclear weapons' possible advantages in the treatment group.

Hypothesis 2. Effective taboo. At the greatest levels of net disadvantage for nuclear weapons, attitudes against their use will look like a taboo: support for nuclear strikes will be low and relatively resistant to change.

Analytic Plan

We test our conditional aversion theory using evidence from our survey experiment and our conjoint/choice task. We will judge our theory by the total weight of this evidence. Our plan for analyzing the data from the two components of our study is outlined below.

Survey Experiment

Our analysis of the survey experiment will focus on subjects' preference between the nuclear and conventional strike options. Let μ represent the proportion of subjects in each treatment condition that preferred the nuclear strike option. We subscript μ with $C = c, E = e$, where $C = 0$ means the nuclear option has worse material consequences, and $C = 1$ means the strike options have the same material consequences. When $E = 0$ the strike options have the same change of success, and $E = 1$ means that the nuclear option has a higher chance of success.

Thus, for example, $\mu_{C=0,E=1}$ is the proportion of subjects preferring the nuclear option within the treatment condition in which nuclear weapons cause more collateral damage and have a higher probability of destroying the terrorist nuclear weapons lab.[8]

Based on our theoretical discussion so far, we expect:

1. **Increasing the nuclear option's material consequences decreases preferences for nuclear use.** Formally, $\mu_{C=1,E=0} > \mu_{C=0,E=0}$ and $\mu_{C=1,E=1} > \mu_{C=0,E=1}$.
2. **Increasing nuclear effectiveness increases preferences for nuclear use.** Formally, $\mu_{C=0,E=1} > \mu_{C=0,E=0}$ and $\mu_{C=1,E=1} > \mu_{C=1,E=0}$.
3. **Increasing nuclear effectiveness increases preferences for nuclear use by a smaller amount when the nuclear option's material consequences are high.** Formally, $\mu_{C=1,E=1} - \mu_{C=1,E=0} > \mu_{C=0,E=1} - \mu_{C=0,E=0}$.

Given our conditional aversion theory, we are most interested in the relative treatment effect of increasing the nuclear strike's effectiveness, *conditional* on the the material consequences of nuclear use (i.e., the third hypothesis above). We are confident that the treatment effect of increasing the nuclear option's relative effectiveness will be statistically detectable when the consequences are the same ($\mu_{C=1,E=1} - \mu_{C=1,E=0} > 0$). We also expect increasing the nuclear option's relative effectiveness to have a positive treatment effect when the consequences of nuclear are greater, but we will not be surprised if we cannot distinguish it from 0 ($\mu_{C=0,E=1} - \mu_{C=0,E=0} \geq 0$).

A formal test of our survey experimental hypotheses will use OLS to estimate the β in:

$$Y_i = \beta_0 + \beta_1 C_i + \beta_2 E_i + \beta_3 C_i E_i + \epsilon_i \tag{9}$$

where C_i and E_i are the same indicators defined above. Respectively, β_1 through β_3 test empirical hypotheses 1 through 3 in the list above. Our preferred specification is Lin estimation. We will also present estimates that do not make use of covariates.

Will 2,000 subjects provide sufficient statistical power to detect the interaction effect between collateral damage and tactical effectiveness? To answer this, we conducted power analysis that is informed by the results of prior studies. Our expectations for these group means are informed by three prior studies: Press et al. (2013); an experimental methods-focused replication of Press and colleagues by Aronow et al. (2019); and our own pilot study. Based on this past work, we assumed a set of group means that we think constitutes a conservative, still reasonable test of our theory. In particular, we wanted to assume a smaller β_3 than previous work would predict.

- **Nuclear More Destructive, Same Effectiveness** ($\mu_{C=0,E=0}$):

[8] We reserve the right to change the coding of C and E if we decide a different coding will lead to a more intuitive presentation of the results. They will always be binary but we might change what 0 and 1 mean.

  - (AUTHORS' NAMES REMOVED): 13.8 percent
  - Power analysis: 12.0 percent

- **Same Material Consequences, Same Effectiveness** ($\mu_{C=1,E=0}$):
  - Press, Sagan, and Valentino: 18.9 percent
  - Aronow, Baron, and Pinson: $\sim$ 10 percent (weighted to match covariate distribution of PSV); $\sim$ 15 percent (unweighted)
  - Power analysis: 18.8 percent

- **Nuclear More Destructive, Nuclear More Effective** ($\mu_{C=0,E=1}$):
  - (AUTHORS' NAMES REMOVED): 12.4 percent
  - Power analysis: 14.7 percent

- **Same Material Consequences, Nuclear More Effective** ($\mu_{C=1,E=1}$):
  - Press, Sagan, and Valentino: 51.4 percent
  - Aronow, Baron, and Pinson: $\sim$ 60 percent (weighted); $\sim$ 50 percent (unweighted)
  - Power analysis: 31.5 percent

Using these estimates as a guide, we conducted a power analysis using the `Declare_Design` package in `R`. As we have clear directional expectations, we will conduct one-tailed tests. The following summarizes the results:

- **Power for** β_1: We assumed an effect of $\mu_{C=1,E=0} - \mu_{C=0,E=0} = 0.069$. In our simulations, we rejected the null hypothesis that $\beta_1 = 0$ in 92 percent of simulations. However, our theory is consistent with a relatively small effect for β_1, and thus we will not be surprised if we are unable to statistically distinguish our estimate of β_1 from 0.

- **Power for** β_2: We assumed an effect of $\mu_{C=0,E=1} - \mu_{C=0,E=0} = 0.126$. We rejected the null hypothesis that $\beta_2 = 0$ in 99 percent of simulations.

- **Power for** β_3: We assumed an effect of $[\mu_{C=1,E=1} - \mu_{C=0,E=1}] - [\mu_{C=1,E=0} - \mu_{C=0,E=0}] = 0.099$. We rejected the null hypothesis that $\beta_3 = 0$ in 87.5 percent of simulations.

Our other main analysis will be of the open-ended justifications of strike choice. We will hire research assistants to code the responses according to a protocol reported in the appendix of this pre-analysis plan. This analysis will focus on the reasons that subjects provide for choosing the conventional strike option over the nuclear strike option, and whether those reasons reflect material consequentialist, strategic, or taboo-related logics. We analyze the overall proportions and make a Venn diagram to examine overlap between them. We expect the results of this analysis to reflect treatment status. In treatment conditions that present the nuclear option as more harmful to civilians and the environment, we expect at least

strong plurality of respondents will justify their choice with reference to the greater material consequences produced by nuclear weapons. In treatment conditions that present the nuclear option as equally harmful to civilians and the environment as the conventional alternative, we expect that there will be more strategically-grounded justifications, and, perhaps counterintuitively, more taboo-like aversion.

Our remaining outcome variables are included mainly for the sake of replicating PSV. They were not essential to our draft manuscript based on study 1, and we will likely report them in the appendix. However, we do have a hypothesis that question order affects the approval questions: subjects may say they "approve" nuclear strikes because they want to strike the facility, not because they prefer to do it with a nuclear weapon. If given the chance to say that they approve of a strike, perhaps they will express lower support for nuclear strikes. To learn about this, we will randomize the order of the nuclear and conventional approval variables.

Choice Experiment

Our expectations for the choice experiment are similar to the hypotheses for the survey experiment. In the choice experiment, we will have more granular data on support for nuclear strikes given different levels of net disadvantages and tactical success. We expect the following trends to emerge:

- Adding more net disadvantages reduce support for nuclear strikes
- Increasing tactical effectiveness of nuclear strikes increases support
- The treatment effects of greater tactical effectiveness and fewer military casualties decrease as number of net disadvantages increases.

For a statistical test of these hypotheses, we will take advantage of the fact that for the set of advantages and disadvantages we have stipulated, preference for nuclear strikes appears roughly linear in the number of disadvantages it faces. Assuming that the relationship is linear and testing for a difference in slopes provides an easy-to-reach-for statistical test of the hypotheses just listed. We will use OLS to estimate

$$Y_{ij} = \alpha_0 + \alpha_C C_{ij} + \alpha_E E_{ij} + \beta B_{ij} + \delta_C C_{ij} B_{ij} + \delta_E E_{ij} B_{ij} + \epsilon_i \tag{10}$$

where Y indicates preferring a nuclear to a conventional strike, i indexes respondents, and j indexes matchups. E_{ij} indicates whether indicators are equally (0) or more (1) effective than conventional weapons. C_{ij} indicates whether the nuclear option would involve the same number of U.S. military casualties as the conventional option (0) or fewer casualties (1). B_{ij} is the number of nuclear disadvantages.

Our main interest is in the two interaction coefficients, δ_C and δ_E. We expect these to be

negative,[9] implying that the effect of each nuclear advantage is decreasing in the number of nuclear disadvantages.

To be clear, we think that relative to OLS, the logistic function is a much better parametric model for preferences over nuclear weapons. This is because unlike OLS, it accounts for the idea that the marginal effect of any particular advantage or disadvantages depends on how many other advantages and disadvantages are present at baseline. We have selected OLS to test the theory because we have strong theoretical expectations and a good reason to think that OLS provides a straightforward, if approximate, test of those expectations.

The key threat to this test's ability to detect the expected effect is that our assumptions about the relative influence of the advantages and disadvantages end up being very wrong. Once the logistic function passes 0.5 on the Y-axis, its slope starts decreasing. If the equivalent of Figure E.1's upper rightmost triangle is substantially larger than its predicted value, the test we have specified here will not be as appropriate as we expect it to be.

We will also conduct the following analyses:

- Fit the an unrestricted version of model, using both the restricted randomization and the pure conjoint.
- Report the AMCE's from the conjoint. We expect to use this as a first look at the relative importance of each attribute in affecting respondents' choices. However, the AMCE's will not be the main focus of our analysis of the conjoint.
- Run simulations in which we vary η to explore how strong the gut aversion would have to be to make nuclear support extremely low when nukes' typical disadvantages are framed away. This will show the level of inherent aversion towards the use of nuclear weapons necessary for the strong defintion of the taboo to be operative.
- Use the unrestricted choice task to look at the full preference profile. For that, we will assume that $\alpha_k = \beta$ and throw all factors onto a single axis. Then we will plot model estimates against the observed data. This figure is just like the main figure in Study 1 (Figure 4), and it shows how support for nuclear use moves in relation to the net advantages of a nuclear strike.

[9] Depending on what we decide is most intuitive, we reserve the right to decide to code B_{ij} on $\{-3, -2, -1, 0\}$ instead of $\{0, 1, 2, 3\}$. In this case, the coefficients would be positive instead of negative.