Online Appendix

A Fragile Public Preference for Cyber Strikes:
Evidence from survey experiments in the United States, United Kingdom and Israel

Contemporary Security Policy

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Online Appendix A: Complete scripts of terror manipulations

Scripts of fatal cyber terror and fatal conventional terror scenarios

We are here live, in front of the (Cyber) Headquarters of the National Security Taskforce, and in just a few minutes we will be cutting to live coverage of the press conference with Dr. Henry Williams, chief of the (cyber) taskforce. According to initial reports, an unprecedented (cyber) terror attack has breached Amtrak's security, causing a train to derail. At this time, police reports indicate that seven passengers, including children, were killed. From the hospital in Cambridge we are told that another 10 passengers are critically wounded, with others being treated for serious injuries. Until further notice, all train services have been halted.
For those of you joining us, we can now report that several hours ago an unprecedented (cyber) terror attack was launched on the United States. As part of this attack, hostile parties successfully hacked into a computer terminal / broke into a transport terminal at Amtrak, causing / and detonated an explosive device that caused a train to derail. Again, 7 passengers are dead and 10 others critically injured after a train derailed following a deadly (cyber) attack on Amtrak.
Security forces inform us that officials have yet to identify the perpetrator of the attack, but that the resources required to pull off an attack of this scope would have to be considerable. Senior officials have confirmed that they will be working around the clock to identify the perpetrators and restore security. Until the press conference begins, back to you in the studio.

Scripts of non-fatal cyber terror and non-fatal conventional terror scenarios

We are here live, in front of the (Cyber) Headquarters of the National Security Taskforce, and in just a few minutes we will be cutting to live coverage of the press conference with Dr. Henry Williams, chief of the (cyber) taskforce. According to initial reports, an unprecedented (cyber) terror attack has breached Amtrak's security, allowing attackers to steal the credit card details of hundreds of thousands of passengers. With reports still coming in, we are informed that the (cyber) attack successfully funnelled tens of millions of dollars into foreign accounts.
For those of you joining us, we can now report that several hours ago an unprecedented (cyber) terror attack was launched on the United States. As part of this attack, hostile parties successfully hacked into a computer terminal / broke into a transport terminal at Amtrak, and detonated an explosive device, stealing the credit card details of hundreds of thousands of passengers. Again, tens of millions of dollars have been funnelled to foreign accounts following a (cyber) attack on Amtrak.
Security forces inform us that officials have yet to identify the perpetrator of the attack, but that the resources required to pull off an attack of this scope would have to be considerable. Senior officials have confirmed that they will be working around the clock to identify the perpetrators and restore security. Until the press conference begins, back to you in the studio.

Note: The scripts above reflect the news clips that appeared to participants in the United States. Participants in the United Kingdom *and Israel viewed clips where the name of the city / country / railway organization reflected local names. The rest of the script remained identical.*

NBC NEWS
SPECIAL
REPORT

sky NEWS HD

Online Appendix B: Detailed statistics and balance checks across the conditions

Sample: United States, Experiment 1

	Cyber Terrorism – Fatal (n = 118)			Cyber Terrorism – Non-Fatal (n = 121)			Conventional Terrorism – Fatal (n = 121)			Conventional Terrorism – Non Fatal (n = 122)			Control Group (n=125)		
Variable name	M	SD	range or *n* (%)	M	SD	range or *n* (%)	M	SD	range or *n* (%)	M	SD	range or *n* (%)	M	SD	range or *n* (%)
Born (year)	1981	10.0	[1947-1997]	1981	10.8	[1946-1998]	1983	9.2	[1954-1998]	1983	10.5	[1948-1999]	1981	11.0	[1948-1997]
Gender (%)															
Female			56 (48)			53 (44)			53 (44)			56 (46)			58 (46)
Male			62 (52)			68 (56)			68 (56)			66 (54)			67 (54)
Marital status															
Single			33 (28)			40 (33)			31 (26)			37 (30)			37 (30)
In Relationship			11 (9)			22 (18)			29 (24)			21 (17)			23 (18)
Married			69 (59)			49 (41)			55 (46)			58 (48)			54 (43)
Divorced			5 (4)			8 (7)			6 (5)			5 (4)			7 (6)
Widowed			0 (0)			2 (2)			0 (0)			1 (1)			4 (3)
Children	1.08	1.16	[0-4]	1.03	1.30	[0-5]	1.05	1.36	[0-7]	.98	1.17	[0-5]	0.86	1.18	[0-6]
Education															
Elementary			0 (0)			0			0			0			0
Secondary			21 (18)			24 (20)			25 (21)			22 (18)			26 (21)
Post-sec.			24 (20)			38 (31)			24 (10)			26 (21)			22 (18)
Bachelors			57 (48)			43 (36)			55 (46)			56 (46)			57 (48)
Masters / PhD			16 (14)			16 (13)			17 (14)			18 (15)			20 (16)

Political Ideology															
Extremely right			6 (5)			12 (10)			7 (6)			9 (7)			6 (5)
Right			22 (19)			18 (15)			21 (17)			19 (16)			34 (27)
Slightly right			11 (9)			13 (11)			23 (19)			15 (12)			10 (8)
Center			26 (22)			19 (16)			21 (17)			21 (17)			27 (22)
Slightly left			15 (13)			20 (17)			15 (12)			18 (15)			9 (7)
Left			24 (20)			24 (20)			21 (17)			26 (21)			26 (21)
Extremely left			14 (12)			15 (12)			13 (11)			14 (12)			13 (10)
Income															
Low			10 (9)			7 (6)			6 (5)			7 (6)			7 (6)
Much lower than average			15 (13)			25 (21)			14 (12)			13 (11)			12 (10)
A little lower than average			12 (10)			11 (9)			16 (13)			16 (13)			25 (20)
Average			31 (26)			24 (20)			35 (29)			34 (28)			25 (20)
A little higher than average			34 (29)			38 (31)			30 (25)			34 (28)			41 (33)
Much higher than average			14 (12)			16 (13)			19 (16)			16 (13)			14 (11)
High			2 (2)			0 (0)			1 (1)			2 (2)			1 (1)
Previous exposure to terror-attacks			.58			.60			.57			.66			.54
Web knowledge	4.64	1.17	[1.67-6]	4.68	1.06	[2-6]	4.82	0.94	[2.67-6]	4.78	1.05	[2-6]	4.73	1.02	[2.33-6]
Anxiety (STAI)	3.43	1.37	[1-6]	2.98	1.15	[1-5.5]	3.54	1.27	[1-6]	3.33	1.23	[1-6]	2.21	.99	[1-4.7]
Anger (STAXI)	2.71	1.76	[1-6]	1.91	1.13	[1-5.5]	2.69	1.60	[1-6]	2.60	1.54	[1-6]	1.54	1.16	[1-5.75]

Sample: United Kingdom, Experiment 1

	Cyber Terrorism – Fatal (n = 120)			Cyber Terrorism – Non-Fatal (n = 119)			Conventional Terrorism – Fatal (n = 118)			Conventional Terrorism – Non Fatal (n = 120)			Control Group (n=120)		
Variable name	M	SD	range or *n* (%)	M	SD	range or *n* (%)	M	SD	range or *n* (%)	M	SD	range or *n* (%)	M	SD	range or *n* (%)
Born (year)	1981	11.7	[1954-2000]	1982	11.9	[1953-2000]	1981	12.2	[1953-2000]	1982	11.8	[1953-1999]	1981	12.2	[1953-2000]
Gender (%)															
Female			71 (59)			70 (59)			75 (64)			86 (72)			80 (66)
Male			49 (41)			49 (41)			43 (36)			34 (28)			40 (33)
Marital status															
Single			42 (35)			34 (29)			35 (30)			40 (33)			34 (19)
In Relationship			31 (26)			39 (33)			34 (29)			39 (33)			45 (38)
Married			47 (39)			40 (34)			46 (39)			34 (28)			44 (37)
Divorced			0 (0)			4 (3)			3 (3)			6 (5)			7 (6)
Widowed			0 (0)			2 (2)			0 (0)			1 (1)			1 (1)
Children	.91	1.14	[0-5]	1.02	1.49	[0-11]	1.03	1.15	[0-4]	.95	1.29	[0-8]	1.08	1.31	[0-6]
Education															
Elementary			0 (0)			0			0			0			0
Secondary			32 (27)			32 (27)			41 (35)			28 (23)			26 (22)
Post-sec.			26 (22)			20 (18)			26 (22)			29 (24)			38 (32)
Bachelors			49 (41)			53 (45)			36 (31)			46 (38)			40 (33)
Masters / PhD			13 (11)			14 (12)			15 (13)			17 (14)			16 (13)

Political Ideology															
Extremely right			0 (0)			0 (0)			1 (1)			0 (0)			2 (2)
Right			11 (9)			8 (7)			11 (9)			7 (6)			8 (7)
Slightly right			15 (13)			10 (8)			8 (7)			15 (13)			10 (8)
Center			40 (33)			35 (29)			42 (36)			46 (38)			45 (38)
Slightly left			21 (18)			22 (19)			25 (21)			26 (22)			20 (17)
Left			30 (25)			37 (31)			24 (20)			25 (21)			30 (25)
Extremely left			3 (3)			7 (6)			7 (6)			1 (1)			5 (4)
Income															
Low			7 (6)			7 (6)			10 (9)			9 (8)			11 (9)
Much lower than average			8 (7)			7 (6)			11 (9)			16 (13)			18 (15)
A little lower than average			20 (17)			15 (13)			28 (24)			18 (15)			15 (13)
Average			23 (19)			26 (22)			16 (14)			26 (22)			24 (20)
A little higher than average			46 (38)			47 (40)			44 (37)			30 (25)			29 (24)
Much higher than average			15 (13)			17 (14)			9 (8)			21 (18)			22 (18)
High			1 (1)			0 (0)			0 (0)			0 (0)			1 (1)
Previous exposure to terror-attacks			.59			.55			.54			.48			.54
Web knowledge	3.90	1.33	[1-6]	3.90	1.29	[1.33-6]	4.07	1.20	[1.5-6]	3.89	1.32	[1-6]	3.92	1.22	[1.33-6]
Anxiety (STAI)	3.31	1.10	[1-6]	2.90	1.01	[1-5.5]	3.44	1.14	[1-6]	3.22	1.02	[1-5.83]	2.39	.88	[1-5.17]
Anger (STAXI)	2.04	1.30	[1-6]	1.68	1.02	[1-6]	2.32	1.51	[1-6]	2.09	1.30	[1-5.75]	1.23	.47	[1-3.5]

Sample: Israel, Experiment 1

	Cyber Terrorism – Fatal (n = 128)			Cyber Terrorism – Non-Fatal (n = 131)			Conventional Terrorism – Fatal (n = 122)			Conventional Terrorism – Non Fatal (n = 125)			Control Group (n=138)		
Variable name	M	SD	range or *n* (%)	M	SD	range or *n* (%)	M	SD	range or *n* (%)	M	SD	range or *n* (%)	M	SD	range or *n* (%)
Born (year)	1980	13.7	[1954-2000]	1980	13.2	[1955-2000]	1979	13.1	[1954-2000]	1978	13.4	[1954-2000]	1979	12.6	[1955-2000]
Gender (%)															
Female			64 (50)			73 (56)			60 (49)			62 (50)			70 (51)
Male			64 (50)			58 (44)			62 (51)			63 (50)			68 (49)
Marital status															
Single			31 (24)			36 (28)			35 (29)			18 (14)			31 (23)
In Relationship			16 (13)			12 (9)			11 (9)			12 (10)			13 (9)
Married			76 (59)			66 (50)			62 (51)			80 (64)			75 (54)
Divorced			4 (3)			17 (13)			14 (12)			14 (11)			17 (12)
Widowed			1 (1)			0 (0)			0 (0)			1 (1)			2 (1)
Children	1.94	2.05	[0-11]	1.60	1.66	[0-8]	1.70	1.70	[0-6]	1.86	1.63	[0-9]	1.73	1.57	[0-6]
Education															
Elementary			1 (1)			4 (3)			2 (2)			3 (2)			3 (2)
Secondary			50 (39)			53 (41)			46 (38)			44 (35)			53 (31)
Post-sec.			63 (49)			60 (46)			67 (55)			59 (47)			64 (46)
Bachelors			12 (9)			13 (10)			6 (5)			19 (15)			16 (12)
Masters / PhD			2 (2)			1 (1)			1 (1)			0 (0)			2 (1)

Political Ideology															
Extremely right			6 (5)			16 (12)			9 (7)			9 (7)			6 (4)
Right			40 (31)			30 (23)			29 (24)			34 (27)			40 (29)
Slightly right			32 (25)			28 (21)			22 (18)			23 (18)			20 (15)
Center			31 (24)			36 (28)			43 (35)			41 (33)			47 (34)
Slightly left			11 (9)			17 (13)			13 (11)			12 (10)			14 (10)
Left			7 (6)			4 (3)			6 (5)			3 (2)			10 (7)
Extremely left			1 (1)			0 (0)			0 (0)			3 (2)			1 (1)
Income															
Low			24 (19)			13 (31)			31 (25)			28 (22)			38 (28)
Much lower than average			21 (16)			23 (18)			28 (23)			25 (20)			29 (21)
A little lower than average			27 (21)			25 (19)			11 (9)			21 (17)			13 (9)
Average			28 (22)			21 (16)			34 (28)			33 (26)			40 (29)
A little higher than average			15 (12)			10 (8)			11 (9)			8 (6)			12 (9)
Much higher than average			12 (9)			7 (5)			5 (4)			7 (6)			5 (4)
High			1 (1)			4 (3)			2 (2)			3 (2)			1 (1)
Previous exposure to terror-attacks			.50			.44			.46			.57			.44
Web knowledge	3.75	1.34	[1-6]	3.99	1.33	[1.5-6]	4.01	1.28	[1.67-6]	3.94	1.35	[1.33-6]	3.96	1.28	[1.5-6]
Anxiety (STAI)	3.14	1.13	[1-5.33]	3.00	1.18	[1-5.5]	3.22	1.27	[1-6]	2.80	1.22	[1-5.67]	2.45	.93	[1-5.33]
Anger (STAXI)	1.94	1.21	[1-6]	1.88	1.21	[1-6]	2.16	1.34	[1-6]	1.84	1.26	[1-6]	1.32	.69	[1-5.25]

Online Appendix C: Analyses for Post-Hoc Control Condition Theory

The results of the experiments revealed surprisingly high levels of demand for both cyber and conventional retaliation for participants in the control group - who did not view any video manipulations depicting terror strikes. We hypothesized that the high support for retaliation in this control condition group is grounded in an explanation according to which the survey questions –supplied without any context or video manipulations – conjured up a worst-case scenario, which explains why support for retaliation was so high. To confirm this, we ran a post-hoc analysis with a new dataset (N=737 in the United States, United Kingdom and Israel). Following the same methodology as in study 1, participants were randomly assigned to one of five treatment groups – lethal cyber, non-lethal cyber, lethal conventional, non-lethal conventional, and a control group. Each of the participants viewed the corresponding video news report, and the control group did not view anything. After the treatment phase, and as part of the same survey described in study 1, participants were asked three questions about how they perceived the retaliatory options. The results appear in table C1.

1) Were you thinking about a particular type of attacker?
    - 'I wasn't thinking about a particular type of attacker';
    - 'A terror organization';
    - 'A foreign country';
    - 'A criminal organization';
    - 'A single person / lone-wolf';
    - 'A local group inside my country';
    - 'Other'.
2) Were you thinking about a specific attacker?
    - 'I wasn't thinking about a particular attacker';
    - 'Iran';
    - 'North Korea';
    - 'ISIS / Al-Qaeda';
    - 'Hamas / Hezbollah';
    - 'Russia';
    - 'China';
    - 'Other'.
3) Were you thinking about an attack against the US / England / Israel with particular consequences?
    - 'I wasn't imagining a particular type of attack';
    - 'A major attack causing 50+ deaths';
    - 'A medium-sized attack causing 10-50 deaths';
    - 'A small attack causing less than 10 deaths';
    - 'An non-lethal attack that targeted financial, transportation or other infrastructure, but didn't kill anyone';
    - 'Other'.

We hypothesized that for the control group participants – who had not viewed any video news reports - the question will have raised the specter of a worst-case scenario since it arrived out of the blue with no prior warning. Absent any modulating information, terrorism is associated with death and destruction. If this hypothesis were true, which explains why the control group exhibited such high levels of support for retaliation, then we would see limited differentiation between the answers given in this post hoc analysis by the control group and conventional terrorism groups. We conducted a chi-square test to compare the results between the manipulation conditions. For question 1 about the type of attacker, the chi-square analyses reveals a significant difference between the control and conventional-lethal condition in at least one of the cells ($\chi 2$ (df = 6) = 17.05, p = 0.009). For question 2 about the identity of the attacker, there was no difference between the two treatment groups ($\chi 2$ (df = 7) = 8.72, p = 0.274). For question 3, which asked about the consequences of the attack, the analysis suggested that there was a significant difference between the conditions in at least one cell ($\chi 2$ (df = 5) = 13.29, p = 0.021). We then tested for the adjusted residual in each cell – which allows us to understand where any differences lie. For question 1, the only significant difference between the two treatment groups was that control group members were more likely to infer that the attack was launched by a foreign country (Count=44; Expected Count=32.1; Adjusted Residual=3.4; p<.001) and less likely to believe that the attack was conducted by a terror group (Count=51; Expected Count=65.8; Adjusted Residual=-3.5; p<.000). For question 3, the only significant difference between the groups was that the control group participants were less moved to imagine that the attack was a minor attack (Count=9; Expected Count=16.1; Adjusted Residual=-2.7; p<.007).

Overall, the results affirm our hypothesis that the control group members envisioned a worst-case scenario, which explains why they supported retaliation at such high levels, akin even to the participants who viewed a lethal conventional terrorist attack. Essentially, the only difference between the treatment conditions was that the control participants guessed that the attack was a major attack, and then it was conducted by an enemy state.

Table C1 –Post-Hoc Results

Were you thinking about a particular type of attacker?

	I wasn't thinking about a particular type of attacker	A terror organization	A foreign country	A criminal organization	A single person / lone-wolf	A local group inside my country	Other	Total
Cyber Lethal	29	53	38	9	4	4	2	139
Cyber Non-Lethal	42	52	28	19	2	4	0	147
Conventional Lethal	35	76	18	5	7	3	1	145
Conventional Non-Lethal	45	61	18	15	5	2	1	147
Control	46	51	44	4	7	3	1	156
Total	197	293	146	52	25	16	5	734

Were you thinking about a specific attacker?

	I wasn't thinking about a particular attacker	Iran	North Korea	ISIS / Al-Qaeda	Hamas / Hezbollah	Russia	China	Other	Total
Cyber Lethal	73	22	7	26	3	7	1	0	139
Cyber Non-Lethal	92	21	1	16	3	6	3	5	147
Conventional Lethal	77	11	1	32	14	6	1	3	145
Conventional Non-Lethal	84	14	2	18	14	9	2	4	147
Control	84	21	2	20	17	8	3	1	156
Total	410	89	13	112	51	36	10	13	734

	Were you thinking about an attack against the US with particular consequences?						
	I wasn't imagining a particular type of attack	A major attack causing 50+ deaths	A medium-sized attack causing 10-50 deaths	A small attack causing less than 10 deaths	An non-lethal attack that targeted financial, transportation or other infrastructure, but didn't kill anyone	Other	Total
Cyber Lethal	69	20	24	14	12	0	139
Cyber Non-Lethal	81	16	5	4	41	0	147
Conventional Lethal	66	20	21	22	14	2	145
Conventional Non-Lethal	66	20	15	6	40	0	147
Control	87	21	13	9	25	1	156
Total	369	97	78	55	132	3	734

Online Appendix D: Replication of experiment 1 results in experiment 2 dataset

The aim of the second study was to examine whether participants who are exposed to news reports of cyber attacks that cause lethal consequences will develop a different understanding of the nature of cyber attacks. Prior to running this ensuing analysis, we first attempted to replicate the results of the first study with this new dataset. The second study used a new sample of respondents in the United States, the United Kingdom and Israel. Once again, we randomly allocated participants (n = 737) into the same five experimental conditions. The survey was disseminated on February 27, 2020, using online survey companies (Amazon Mechanical Turk, Prolific and Midgam) in the US, UK and Israel. An attention check was conducted following the manipulation leading to the exclusion of 3 participants (0.4% of the total). The study participants represented a cross study of the general population in each country US: (N=246 , Mage= 38 years, SD =11.22); UK: N=235, Mage= 36 years, SD = 10.86) and Israel, (N=253, Mage = 41, SD = 13.67).

To corroborate the results of the first study, we ran five paired T-test analyses that compared the differential support for cyber and kinetic military strikes in each of the experimental conditions. The analysis method was identical to that used in study 1. The results were consistent between the studies, with all condition groups indicating significantly higher support for using cyber weapons – apart from those participants who were exposed to the cyber-lethal experimental treatment and control condition. The analyses appear below.

Paired t-Test Analyses Comparing Support for Cyber and Kinetic Strikes by Terror Conditions

			United States			
	Terror Condition		N	Mean	Diff	t (df)
1	Cyber Terror - Fatal	Cyber Retaliation	140	3.16	.09	1.20 *n.s.* (139)
		Kinetic Retaliation	140	3.07		
2	Cyber Terror – Non-Fatal	Cyber Retaliation	148	2.92	.47	4.51 * (147)
		Kinetic Retaliation	148	2.45		
3	Conventional Terror - Fatal	Cyber Retaliation	145	3.22	.21	2.56 * (144)
		Kinetic Retaliation	145	3.01		
4	Conventional Terror – Non Fatal	Cyber Retaliation	148	3.21	.34	3.98 * (147)
		Kinetic Retaliation	148	2.87		
5	Control	Cyber Retaliation	156	3.31	.16	2.13 *n.s.* (155)
		Kinetic Retaliation	156	3.15		

- *Significant with Bonferroni correction ($p < 0.01$).*

Online Appendix E: Robustness test for study 2

To test the robustness of the findings in study 2, we examined whether participants in the cyber-lethal treatment condition indicated vastly different attitudes about other elements of cyber power. It may be that exposure to lethal cyber attacks is such a profoundly confusing phenomenon that it distorts all attitudes about the nature of cyber weapons. As such, we asked participants to indicate their level of agreement with a third statement that was measured on the same six-point scale – 'Cyber attacks can lead to armed conflict'. An analysis of variance identified no significant differences in the responses given by participants in the four terror conditions, with only the control condition indicating significantly lower agreement with the statement compared to the cyber-lethal group.[1] ($F(4, 733) = 5.459$, $p < .000$). This is in stark contrast to the previous statements where the cyber-lethal condition was significantly higher than all other conditions. This suggests that exposure to lethal cyber terror attacks imparts an understanding of the lethal and destructive potential consequences of these tools, but it does not alter all perceptions about their utility and that those who are exposed are still able to provide reasoned responses about its use.

[1] A bonferonni correction was applied to control for the number of analyses that were run, yielding an alpha level of .017.