

Appendices And Extensions For: Michael C. Horowitz, “Nonstate Actors and the Diffusion of Innovations: The Case of Suicide Terrorism,” *International Organization* 64:1 (Winter 2010), pp. 33-64.

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Appendix A: Suicide Terrorism Group Linkages

Figure 3 in the article raises the question of connections between non-suicide adopters. To answer that question, I gathered data from MIPT on the connections between all groups. Combined with the data on adoption of suicide attacks, I created three variables for each group, a number of connections variable, a number of connections to suicide attack adopters variable, and a ratio of the two. The raw connections data shows that, on average, adopters have significantly more ties to other groups than non-adopters (verified through a t-test). More importantly, the ratio data shows the percentage of connections a given group has to groups that have adopted suicide attacks. A score of .5 means 50% of a groups connections are to groups that have adopted suicide attacks, while a score of .1 means only 10% of a groups connections are to groups that have adopted. The mean score for suicide adopters is .43, compared to .19 for non-adopters. The difference is significant according to a t-test.

Appendix A, Table 1

Suicide	Mean Percentage Of Connections With Suicide Terror Adopters
0	0.1875599
1	0.4259577
Total	0.2433255

Just looking at the number of connections to other groups reveals the same thing. Those groups that adopt suicide attacks have more linkages than non-adopters

Appendix A, Table 2

Suicide	Mean Number Of Connections
0	2.010526
1	5.682927
Total	2.662338

This shows there are significant differences in the connection patterns of suicide groups versus non-suicide groups. While this analysis does not cover the indirect connections shown in figure 3, it suggests, based on the available evidence, that figure 3 is not simply an artifact of the data on suicide attack adopters. However, there is an endogeneity problem in the data since it does not show the timing of connections between groups. It is therefore not possible to tell whether groups connected before or after they adopted suicide attacks. Thus, while this data is potentially useful, care has to be taken in

interpretation. Appendix A, Table 3 below shows that the results from Models 3 and 4 in Table 1 are consistent when including the number of connections variable.

Appendix A, Table 3: Including A Network Connections Variable Into Models 3 and 4 of Table 1

	Connections Model 1 (Extension of Paper Table 1, Model 3)	Connections Model 2 (Extension of Paper Table 1, Model 4)
Organizational Age	-0.0917***	-0.0551
	(0.0284)	(0.0340)
Religious	1.788***	3.168***
	(0.638)	(0.922)
Religious * Organizational Age		-0.116**
		(0.0520)
Number of Connections to Other Groups	0.399***	0.401***
	(0.104)	(0.107)
Communist/Socialist	0.415	0.0820
	(0.945)	(0.986)
Leftist	1.813	1.340
	(1.316)	(1.447)
Nationalist/Separatist	0.160	0.0935
	(0.586)	(0.583)
Other	1.104	1.155
	(1.209)	(1.177)
Lebanon	2.080**	2.141**
	(1.057)	(0.884)
Iraq War	0.385	-0.164
	(0.693)	(0.747)
Israel	0.914	0.882
	(0.844)	(0.943)
Link to Al Qaeda	0.841	0.766
	(0.823)	(0.853)
Constant	-2.990***	-3.578***
	(0.742)	(0.839)
Observations	231	231
Degrees of Freedom	11.000	12.000
Wald Chi2	33.25	40.54
log pseudolikelihood	-62.99	-60.59
Pseudo R2	0.4168	0.439

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Appendix A, Table 4: Description of Links Between Groups in Figure 3¹

<i>Name</i>	<i>Location</i>	<i>Initial Link</i>	<i>Nature of Link</i>	<i>Citation</i>	<i>Further Grouped</i>	<i>Grouped With</i>
Abu Hafs Al-Masri Brigade	Europe	Al Qaeda	Direct	(Terrorism Knowledge Base 2006).	1	AQ Europe
Al-Aarifeen	Pakistan	Al Qaeda	Indirect	(Terrorism Knowledge Base 2006).	1	AQ Inspired -- Pakistan
Al-Aqsa Martyrs Brigade	Israel	al-Fatah	Direct	(Terrorism Knowledge Base 2006).	1	al-Fatah
Al-Bara Bin Malek Brigades	Iraq	Al Qaeda	Direct	(Terrorism Knowledge Base 2006).	1	AQ Iraq
Al-Fatah	Israel	Hamas; Palestinian Islamic Jihad	Indirect	(Bloom 2005; Pape 2005; Pedahzur 2005).	0	
Al-Islambouli Brigades of Al-Qaeda	Russia; Pakistan	Al Qaeda; Riyadh us-Saliheyn Martyrs' Brigade	Direct	(Terrorism Knowledge Base 2006).	0	
Al-Mansoorain	Kashmir	Al Qaeda	Indirect	(Terrorism Knowledge Base 2006).	1	AQ Inspired -- Pakistan
Al-Qaeda	World	Hezbollah	Direct	(National Commission on Terrorist Attacks upon the United States 2004).	0	
Al-Qaeda in the Arabian Peninsula (AQAP)	Saudi Arabia	Al Qaeda	Direct	(Terrorism Knowledge Base 2006).	1	AQ ME
Al-Qaeda Organization in the Land of the Two Rivers	Middle East	Al Qaeda	Direct	(Terrorism Knowledge Base 2006).	1	AQ Iraq
Al-Qanoon	Pakistan	Al Qaeda; Lashkar-e-Jhangvi (LeJ)	Direct	(Terrorism Knowledge Base 2006).	1	AQ Inspired -- Pakistan
Al-Quds Brigades	Israel	Palestinian Islamic Jihad	Direct	(Ricolfi 2005).	1	Palestinian Islamic Jihad
Amal	Lebanon	Hezbollah	Direct	(Kramer 1990).	0	
Ansar Al-Islam	Iraq	Al Qaeda	Direct	(Terrorism Knowledge Base 2006).	1	AQ Iraq
Ansar Allah	Lebanon	Hezbollah	Direct	(Terrorism Knowledge Base 2006).	0	
Ansar al-Sunnah	Iraq	Al Qaeda	Direct	(Terrorism	1	AQ Iraq

¹ Also note that the suicide attack adopter classifications in Figure 3 are based on a maximalist interpretation of suicide attack adoption.

Army				Knowledge Base 2006).		
Armed Islamic Group (GIA)	Algeria	None			0	
Army for the Liberation of Kurdistan	Lebanon	None			0	
Black Widows	Chechnya/Russia	Riyad us-Saliheyn Martyrs' Brigade; Al Qaeda	Direct	(Pedahzur 2005; Terrorism Knowledge Base 2006).	1	Chehnyan
DHKP/C (Revolutionary People's Liberation Party/Front)	Turkey	PKK	Indirect	(Terrorism Knowledge Base 2006).	0	
Hamas	Israel	Hezbollah	Direct	(Aboul-Enein 2005, 9; Dolnik and Bhattacharjee 2002, 109; Levitt 2004; Ricolfi 2005, 91-92; Schweitzer 2002, 3).	1	PIJ
Harakat ul-Mujahidin (HuM)	Kashmir	Al Qaeda	Direct	(Terrorism Knowledge Base 2006).	1	AQ Inspired -- Pakistan
Hezbollah	Lebanon	Iranian Government	Direct	(Kramer 1990).	0	
Hizbul Mujahideen (HM)	Kashmir	(Lashkar-e-Toiba)		(Terrorism Knowledge Base 2006).	1	AQ Inspired -- Pakistan
Iraqi Liberation Army	Lebanon	None			0	
Islami Chhatra Shibir (ICS)	Bangladesh	Al Qaeda-related groups	Direct	(Terrorism Knowledge Base 2006).	1	AQ Inspired -- Bangladesh
Islamic Army in Iraq	Iraq	Al Qaeda-related groups	Direct	(Terrorism Knowledge Base 2006).	1	AQ Iraq
Islamic Glory Brigades in the Land of the Nile	Egypt	Al Qaeda	Indirect	(Terrorism Knowledge Base 2006).	1	AQ ME
Islamic Jihad Group (Uzbekistan)	Uzbekistan	Islamic Movement of Uzbekistan (IMU); Al Qaeda	Direct	(Pedahzur 2005; Terrorism Knowledge Base 2006).	1	Uzbekistan
Jamatul Mujahedin Bangladesh	Bangladesh	Al Qaeda-inspired; Islami Chhatra Shibir (ICS)	Indirect	(Terrorism Knowledge Base 2006).	1	AQ Inspired -- Bangladesh
Jemaah Islamiya (JI)	Indonesia	Al Qaeda	Direct	(Hoffman and McCormick 2004).	0	
Jenin Martyrs' Brigade	Israel	Hamas	Direct	(Terrorism Knowledge Base 2006).	1	Hamas

Jihad Pegah	Iraq	Al Qaeda	Indirect	(Terrorism Knowledge Base 2006).	1	AQ Iraq
Jund Al-Sham (Army of the Levant)	Lebanon; Qatar	Al Qaeda	Direct	(Terrorism Knowledge Base 2006).	1	AQ ME
Kurdistan Workers' Party (PKK)	Turkey			(Pedahzur 2005).	0	
Lashkar-e-Jhangvi (LeJ)	Pakistan	Al Qaeda; Tailban	Direct	(Pedahzur 2005; Terrorism Knowledge Base 2006).	1	AQ Inspired -- Pakistan
Lebanese National Resistance Front	Lebanon	Hezbollah	Indirect	(Terrorism Knowledge Base 2006).	0	
Liberation Tigers of Tamil Eelam (LTTE)	Sri Lanka	Hezbollah	Direct	(Hoffman and McCormick 2004; Pape 2005).	0	
Mujahideen Shura Council	Iraq	Al Qaeda	Direct	(Terrorism Knowledge Base 2006).	1	AQ Iraq
Palestinian Islamic Jihad (PIJ)	Israel	Hezbollah	Direct	(Aboul-Enein 2005, 9; Dolnik and Bhattacharjee 2002, 109; Levitt 2004; Ricolfi 2005, 91-92; Schweitzer 2002, 3).	1	Hamas
People's Liberation Army of Kurdistan	Turkey	PKK	Direct	(Terrorism Knowledge Base 2006).	0	
Popular Front for the Liberation of Palestine	Israel	Hamas; Palestinian Islamic Jihad	Indirect	(Bloom 2005; Pedahzur 2005).	0	
Riyad us-Saliheyn Martyrs' Brigade	Chechnya/Russia	Al Qaeda	Direct	(Pedahzur 2005; Terrorism Knowledge Base 2006).	1	AQ Chechnya
Secret Organization of al-Qaeda in Europe	Europe	Al Qaeda	Direct	(Terrorism Knowledge Base 2006).	1	AQ Europe
Soldiers of the Prophet's Companions	Iraq	Al Qaeda	Indirect	(Terrorism Knowledge Base 2006).	1	AQ Iraq
Syrian-Inspired (Assorted)	Lebanon	Hezbollah	Indirect	(Kramer 1990).	0	
Taliban	Afghanistan	Al Qaeda	Direct	(Hoffman and McCormick 2004; Terrorism Knowledge Base 2006).	0	
Tanzim	Israel	al-Fatah	Direct	(Terrorism Knowledge Base 2006).	1	al-Fatah

Tawhid and Jihad	Iraq	Al Qaeda	Direct	(Terrorism Knowledge Base 2006).	1	AQ Iraq
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APPENDIX A SOURCES

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Appendix B, Table 1: Summary Statistics

Summary Statistics for Universe of Cases Used In Models 1-4

	Minimum	Maximum	P50	Mean	Standard Deviation
<i>Use of Suicide Terrorism</i>	0	1	0	0.176	0.382
<i>Organizational Age</i>	0	51	22	21.159	14.097
<i>Religion</i>	0	1	0	0.326	0.470
<i>Religion * Organizational Age</i>	0	51	0	4.052	8.763
<i>Communist/Socialist</i>	0	1	0	0.232	0.423
<i>Leftist</i>	0	1	0	0.069	0.253
<i>Nationalist/Separatist</i>	0	1	1	0.541	0.499
<i>Other</i>	0	1	0	0.073	0.261
<i>Lebanon</i>	0	1	0	0.073	0.261
<i>Iraq War</i>	0	1	0	0.060	0.238
<i>Israel</i>	0	1	0	0.056	0.230
<i>Al Qaeda Link</i>	0	1	0	0.082	0.274

Appendix C: Limitations, Directions for Future Research, and Other Extensions

There are important limitations to this analysis that could serve as a starting point for future research. In particular, there are some potential biases within the MIPT-RAND data. Like the Correlates of War and Militarized Interstate Dispute datasets, the MIPT-RAND data is imperfect. However, use of this data is consistent with recent peer reviewed work (Asal and Rethemeyer 2008; Berman and Laitin 2008). One important limitation is the switch from only coding “international” terrorist groups from 1968-1997 to coding both “domestic” and “international” groups from 1998-2008. Purely internal groups that ceased to operate prior to 1998 were excluded by MIPT, potentially biasing the results. A factor mitigating against this concern is that the coders appear to have been generous in their interpretation of “international,” including groups if their attacks affected foreign nationals. Those excluded, if purely domestic, are also probably disproportionately likely to be coded as nationalist/separatist. They are also all non-adopters, since the dataset on the universe of suicide attacks is independent of the MIPT-RAND data. This suggests inclusion would only strengthen the results. While it is possible those domestic groups that existed prior to 1998 were all younger non-adopters, they could have also been involved in long-term struggles that simply ended. Therefore, it is not possible to draw inferences about the likely age of excluded groups; the bias was not systematic in a way that helped the findings of this paper.

However, given that some bias in the data may exist, even if the exact direction is unknown, I tried to hedge against bias in two additional ways. First, I dropped all groups that did not conduct attacks in the post-1997 period and re-ran the results. They are consistent with the findings in the paper. Second, cross-checking the MIPT-RAND universe with Sambanis’ civil war data revealed only 19 definitively excluded rebel groups (Sambanis 2004). This low number suggests the extent of bias is likely tolerable.

Future research could create and identify more robust measures of alliances between groups as well as clarify some of the hard choices made about which groups conducted certain attacks. Unfortunately, the MIPT-RAND data is no longer being updated (it has now migrated to the START database hosted by the University of Maryland), so research efforts will have to shift to other databases. Additionally, selection models focusing on the link between adoption and casualties or count models looking at the number of times groups used suicide attacks might also help shed light on these issues.

This discussion of suicide bombing may also be helpful for understanding the diffusion of practices. New research by Bloom suggests suicide attacks are now a more regular practice for terrorist groups with the capacity to adopt (Bloom, 2008). However, this process seems to be just beginning for suicide bombing so it is outside the scope of this paper. Though this idea is very tentative, the level of organizational capital required to adopt innovations may also shape what practices groups and societies find attractive, in a modified form, by constraining what is possible.

Below are additional extension models designed to show the robustness of the results in the article. The first, Appendix C, Table 1, restricts the universe of cases to those groups that definitively engaged in attacks after 1980. The purpose of this model is to make sure that the results are not biased by potentially including groups that went out

of existence prior to the beginning of the suicide terrorism era. As you can see below, the results are consistent both with and without the organizational age * religion interaction term.

Appendix C, Table 1: Ensuring the results are not an artifact of pre-1980 groups

	Post-1980 Model 1 (Extension of Paper Table 1, Model 3)	Post-1980 Model 2 (Extension of Paper Table 1, Model 4)
Organizational Age	-0.0450** (0.0225)	-0.00633 (0.0271)
Religious	1.865*** (0.617)	3.242*** (0.902)
Religious * Organizational Age		-0.0983** (0.0436)
Communist/Socialist	1.217 (0.877)	0.837 (0.851)
Leftist	1.618 (1.375)	1.051 (1.501)
Nationalist/Separatist	0.681 (0.536)	0.617 (0.546)
Other	0.206 (1.078)	0.249 (1.093)
Lebanon	1.631** (0.796)	1.643** (0.742)
Iraq War	0.820 (0.670)	0.314 (0.720)
Israel	1.914** (0.954)	1.972* (1.033)
Link to Al Qaeda	1.850** (0.752)	1.766** (0.794)
Constant	-2.983*** (0.697)	-3.638*** (0.842)
Observations	215	215
Degrees of Freedom	10.000	11.000
Wald Chi2	42.20	48.44
log pseudolikelihood	-74.68	-72.09
Pseudo R2	0.2871	0.3118

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Additionally, as noted above, MIPT switched in 1998 from only coding international terrorism incidents to coding both domestic and international terrorism incidents. In Appendix C, Table 2 below I show the results restricting to only post-1997 cases. I also add an organizational size variable drawn from Asal and Rethemeyer (2008) to show the results are still consistent even including their key variable of interest. The organizational size variable is significant and in the predicted direction as well.

Appendix C, Table 2: Ensuring the results are consistent with post-1997 groups and organizational size variable

	Organizational Size Model 1 (Extension of Paper Table 1, Model 3)	Organizational Size Model 2 (Extension of Paper Table 1, Model 4)
Organizational Age	-0.0447**	-0.00340
	(0.0202)	(0.0240)
Religious	1.329**	2.915***
	(0.620)	(0.937)
Religious * Organizational Age		-0.119***
		(0.0458)
Organizational Size	0.682***	0.753***
	(0.247)	(0.243)
Communist/Socialist	0.712	0.156
	(0.989)	(1.016)
Leftist	3.548**	3.039*
	(1.483)	(1.770)
Nationalist/Separatist	0.675	0.617
	(0.700)	(0.713)
Other	0	0
	(0)	(0)
Lebanon	2.127	2.350**
	(1.449)	(1.197)
Iraq War	1.169	0.564
	(0.787)	(0.854)
Israel	2.157**	2.159**
	(0.884)	(1.006)
Link to Al Qaeda	1.889**	1.751**
	(0.848)	(0.871)
Constant	-3.170***	-3.899***
	(0.909)	(0.964)
Observations	128	128
Degrees of Freedom	10.000	11.000
Wald Chi2	31.17	43.09
log pseudolikelihood	-55.33	-52.34
Pseudo R2	0.2631	0.3030

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Finally, to ensure that the results, especially with the interaction term, are not just a function of the logit model, Appendix C, Table 3 below shows the results are consistent with a regression specification as well. Replication of Figure 1 with a regression specification shows the substantive results are also very similar.

Appendix C, Table 3: Ensuring the results are consistent with a regression specification

	Regression Model 1 (Extension of Paper Table 1, Model 3)	Regression Model 2 (Extension of Paper Table 1, Model 4)
Organizational Age	-0.00396** (0.00166)	-0.000568 (0.00148)
Religious	0.223*** (0.0684)	0.447*** (0.112)
Religious * Organizational Age		-0.0136*** (0.00432)
Communist/Socialist	0.106 (0.0662)	0.0717 (0.0657)
Leftist	0.121 (0.0832)	0.0749 (0.0883)
Nationalist/Separatist	0.0789 (0.0596)	0.0724 (0.0580)
Other	0.0350 (0.0768)	0.0391 (0.0755)
Lebanon	0.152 (0.106)	0.151 (0.106)
Iraq War	0.181 (0.131)	0.0779 (0.134)
Israel	0.300* (0.155)	0.287* (0.159)
Link to Al Qaeda	0.366*** (0.134)	0.318** (0.137)
Constant	0.0404 (0.0656)	-0.0241 (0.0607)
Observations	233	233
R-squared	0.298	0.332
F	5.74 (10, 222)	5.29 (11, 221)
Prob > F	0	0
Root MSE	0.32696	0.31955

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

APPENDIX C SOURCES

Asal, Victor and R. Karl Rethemeyer. 2008. "The Nature of the Beast: Organizational Structures and the Lethality of Terrorist Attacks." *Journal of Politics* 70(2): 437-49.