Organizing Terror: Hierarchy and Networks in Covert Organizations

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Abstract

In the four years since the September 11th attacks, a great deal has been written on how Al Qaeda and other terrorist groups have evolved in response to government pressure. The consensus in this literature is that these groups have adopted more "decentralized," "networked" forms of organization in order to survive, and that these forms pose particularly difficult challenges for government counterterrorism. This is a puzzling finding in so far as the historical reaction of terrorist groups under government pressure has been to reduce the interconnections among their members and to strengthen their hierarchy, often by developing security bureaucracies. This paper develops a two-dimensional framework for thinking about the organizational design of covert organizations and analyzes the costs and benefits of different design choices from the standpoint of a boundedly rational terrorist organization. One key finding is that while a decentralized, highly interconnected organizational design makes it harder for government to know whether it is succeeding at counterterrorism, such a design also makes it much harder for terrorists to achieve their political goals, and so may ultimately favor the government.

Introduction

In the four years since the September 11th attacks, a great deal has been written about how Al Qaeda and related islamist terrorist groups have evolved in response to government pressure. The consensus viewpoint is that global counterterrorism pressure on Al Qaeda and affiliates have forced these organizations to adopt more decentralized, less hierarchical, more networked organizational forms. (Pillar 2004, Clarke 2004, Langdon 2003) This is a puzzling finding in that terrorist groups such as Hamas, the Provisional Irish Republican Army (PIRA), and others reacted to government pressure by reducing communications between their members, strengthening their hierarchy, and developing security bureaucracies. These actions, the opposite of what most argue islamist groups have done in the last four years, made groups more resistant to government action. This unexplained discrepancy between the historical adaptation to government pressure and the consensus on the evolution of the current threat points to the need for a better understanding of the organizational design of covert organizations. Specifically, it is worth asking two questions: (1) why has Al Qaeda evolved differently from other terrorist organizations; and (2) can we identify conditions under which organizations will evolve in specific direction? Answering these questions will be useful both for assessing counterterrorism strategies, and for thinking about how best to deal with other covert groups that organize along similar lines.

Unfortunately, there are three problems with using the current analytical framework to assess why the current threat has evolved differently than past groups and how it is likely to evolve in the future. The first problem is the lack of conceptual clarity in much of the current analysis. For example, if is often unclear what the difference is between a traditional hierarchical organization and a group that is "networked." Arquilla and Ronfeldt (1999) cite Hamas and Chicago's "Gangsta Disciples" street gang as examples of networked organizations. Yet Mishal and Sela (2000) show that Hamas has meaningful hierarchy that carefully modulates the use of violence by its supposedly decentralized network of operational cells. Likewise, Levitt and Venkatesh (2000) shows that drug selling gangs in Chicago operate with clear hierarchies, well defined wages, and established promotion structures. A similar confusion emerges in Carley (2004). She argues that "covert organizations, such as terrorist groups, have network structures that are distinct from those

in typical hierarchical organizations; e.g. they are cellular and distributed." Yet one page later her own analysis of the differences between Al Qaeda and Hamas suggests that both groups have a good deal of hierarchy both within and between cells. (Carley 2004, 3) All these examples point to fact that the level of networking is a matter of degree, not of kind. Arquilla and Ronfeldt (1999, 197-198) recognized this subtlety, but it has been lost in the discourse on how Al Qaeda has changed.

Moreover, whether something is a network or a hierarchical group often depends on what level of analysis one is working at. Atran (2004) writes that "the transnational jihad fraternity is transforming into a hydra-headed network more difficult to fight than before." (Atran 2004b, 67) But, he also spends considerable attention analyzing the hierarchical process by which "…charismatic leaders of terrorist groups turn ordinary desires for kinship and religion into cravings for the mission they are pitching, to the benefit of the manipulating organization…."(Atran, 2004b, 80) As Gunaratna's (2004) discussion of Al Qaeda's increasing reliance on associated groups illustrates, changes in Al Qaeda's structure do not necessarily coincide with changes in the structure of local "franchises" such as Group Salafiste pour la Prédication et le Combat (GSPC) in Algeria and Europe, Jemaah Islamiyah (JI) in Indonesia, Al-Ansar al-Islami in Iraq, or the Moro Islamic Liberation Front (MILF) in the Philippines. What looks like a network from 50,000 feet may be a group of cooperating hierarchical organizations when viewed from ground level. In such cases it is far from clear that analyzing groups as networks is superior to analyzing them as collections of hierarchies.

One way to deal with this level-of-analysis problem is to adopt the methodology of the social movement literature, which analyzes social movement organizations (SMO), akin to named terrorist groups such as JI, as components of a larger social movement industry (SMI) made up of all SMO with similar goals, akin to the larger *salafi jihadi* movement. (Zald and McCarthy 1980, Sageman 2004) In many ways, the structure most analysts posit for Al Aqaeda and affiliates is quite similar to that identified in the social movement literature. For example, Oberschall (1980, 45-46) observed that broad social movements often exhibit a loose structure, with many organizations episodically taking part that are short-lived, spatially scattered, and lacking direct communications or common leadership. Unfortunately, while the social movement literature provides a useful descriptive framework, it is ill-equipped to analyze the organizational design choices made within SMO.

Finally, it is not clear that the modes of action posited for networked organizations are incompatible with traditional organizations. Here, it is worth examining the swarming metaphor frequently used to illustrate how decentralized networks attack. (Arquilla and Ronfeldt 1999) Atran (2004a) describes the current conflict as one in which terrorist "factions are swarming on their own initiative – homing in from scattered locations on various targets and then dispersing, only to form new swarms." The observable behavior here is simultaneous attacks by geographically disparate groups. This observation could be consistent with three underlying phenomena: (1) simultaneous attacks coordinated by a hierarchy where government does not observe the hierarchy; (2) simultaneous attacks by several hierarchical organizations that have coordinated in some fashion; or (3) simultaneous attacks by a highly connected, non-hierarchical network. Simply observing swarming behavior tells one little about the organizational structure behind the swarm.

These three problems point to the need for a clearer definition of the concepts at work, the dimensions of organizational design that matter for covert groups. An analysis of the structural evolution of past terrorist groups and a review of the emerging theoretical literature suggest the key dimensions to consider are the interconnectedness of an organization, the level of hierarchical control in that organization, and the degree of specialization in that organization's smallest functional units. Much of the current literature fails to distinguish adequately between these dimensions, treating groups as though they are either decentralized and networked, or hierarchical and compartmentalized. Yet many terrorist groups, and other organizations, independently vary their level of connectedness and their amount of central control.[1] By carefully defining these dimensions, we will be better able to analyze the costs and benefits of different forms of organization for individuals at different levels of the terrorist organization. Knowing these costs and benefits in turn will allows us to generate specific hypotheses about how organizations are likely to evolve under certain conditions and how that evolution will affect their behavior.

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[1] Hierarchy and networks co-exist in all business firms. Indeed, the field of social network analysis was inspired by the recognition that informal networks, operating alongside formal hierarchies in businesses, influence firm behavior in ways that modify, but do not completely supersede, the hierarchical decision-making process. For an examples of such analysis see Krackhardt's (1990) examination of the interaction between formal positional power and power based on knowledge of underlying network connections.

Before proceeding, it is worth briefly discussing the decision-theoretic assumptions underlying the following analysis. Throughout, I assume that both government officials and terrorists are myopically adaptive. By myopically adaptive I mean that their decision process has four characteristics. First, they take the operational environment, the state of the world, as given. Second, they anticipate the other player's reactions but only one step down the game tree. Third, they attempt to take the optimal action given reality as they see it. Fourth, they can make mistakes.[2] Support for using this underlying model of choice can be found in both government and terrorist documents. On the terrorist side, a 1992 Hamas policy memo outlining the pros and cons of participation in the first Palestinian municipal elections considers Hamas' possible actions and Fatah's reactions. It does not consider Hamas' reaction to Fatah's reaction, or seek to identify a stable strategy such that neither side would want to do anything different. (Mishal and Sela 2000, 122-130) On the government side, policy documents on terrorism often fail to take into account the other sides' ability to adapt. For example the 2002 *Abu Dhabi Declaration on Hawala* calls on countries to increase government supervision of Hawala to prevent abuses of the system by terrorist financiers. Neither this document nor Interpol documents on Hawala note that because other informal value transfer systems exist, policing Hawala may merely push terrorists to use other means of moving funds, yielding no net gains for government enforcement efforts.

A more social-scientific rationale for considering myopically adaptive decision makers in this setting is that few of the conditions used to justify models of full rationality, in light of their manifest unreality at the individual level, obtain in covert organizations.[3] For example, ideas of mixed-strategy equilibrium make little sense in this setting because we are not interested in discerning average behavior across a population or across repeated interactions. Likewise, we should not expect agents to have the opportunity to learn to play fully rational strategies through repeated interaction. Neither is there a large population from which organizations playing suboptimal strategies would be selected out, nor a market of

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[2] These behavioral assumptions build on the literature inspired by Simon's work on the concept of boundedly rational decision makers in business firms and government organizations. Simon (1979) provides a summary of this perspective, Conlisk (1996) provides an excellent survey of economic applications of Simonian and other versions of bounded rationality.

[3] See Satz and Ferejohn (1994) and Conlisk (1996) for more thorough discussions of conditions under which the assumption of full rationality yield good predictions about behavior.

sufficient size such that individual deviations from rationality would not impact the market equilibrium. For these reasons, this is a domain of organizational behavior where the assumption of full rationality is unlikely to facilitate productive analysis.

The remainder of the paper proceeds as follows. Section (I) defines the dimensions of organizational design, the parameter space. Section (II) discusses the costs and benefits of different positions in the parameter space. Section (III) provides some preliminary testable hypotheses about how groups will evolve. Section (IV) concludes and argues that certain types of organizational adaptations may make it harder for government to assess its own effectiveness, without actually increasing the terrorists' chances of successful gaining their political goals.

Section I: Dimensions of Organizational Design

Three dimensions of organizational design appear repeatedly in work on covert organizations: interconnectedness, hierarchy, and specialization. Carley (2004) compares Hamas and Al Qaeda on a number of factors including their organizational structure (hierarchy), nature of connections among cell leaders (interconnectedness), and the distribution of skills within cells (specialization). Kenney (2005) focuses mainly on the number of levels in the decision system (hierarchy). Williams (2002) discusses how criminal networks can adopt varying levels of hierarchy and task specialization. Brams, Mutlu, and Ramirez (2005) directly address the problem of identifying the latent influence hierarchy in a terrorist network using data on connections between members (interconnectedness). Baccara and Bar-Isaac (2005) model the strategic choice of hierarchical structures given individual vulnerabilities to detection. Silke (1998, 2000) addresses the relationship between cellular organization (interconnectedness), central control (hierarchy), and specialization within loyalist paramilitaries in Northern Ireland. Bell (2002) distinguishes the current Islamist movement by its lack of hierarchical structures.

Within this literature there is little consensus about what variation on each of these dimensions looks like. Moreover, these concepts are rarely expressed in a way that facilitates measurement and hypothesis testing. This section develops operational definitions for each dimension and argues that variation in specialization is constrained by the security environment.

Interconnectedness

The most established way to think about interconnectedness in organizations is to use the terminology of social network analysis.[4] In the most highly interconnected organization individuals are connected in an "all-channel" network in which every individual is connected to every other individual. In the least interconnected organization, every individual is connected to only two others, forming a "ring" network of radius one. In between, there are myriad forms, but the most common in covert organizations is the cellular structure in which small groups of 4-6 individuals all know each other, forming a "clique," but only one cell member communicates with other cells.[5]

Unfortunately, these three prototypical organizational forms cannot be arrayed along one measurable dimension using standard quantitative measures of network connectivity, measures that take as their input only the structural information contained in the connectivity matrix defining the network. Degree centrality – which measures the average number of connections of an individual in the network – and other measures such as betweeness centrality, do not increases monotonically as one moves from a structure that intuitively seems like a less connected structure to a more connected structure. To make the point concrete, consider two networks. Network A is a cellular network with 4 cells of size 6 and 1 or 2 outside connections per cell. Network B is a cellular network with 6 cells of size 4 and 2 outside connections per cell. By most reckonings, network B would seem more interconnected, yet the mean degree centrality of the network A is higher, 5.3 for Network A vs 3.5 for network B.[6] The problem here is that formal network measures are heavily influence by the dense connections within cells.

To get around this problem, we need to examine why network connections matter in covert organizations. These connections have two effects. First, they provide a means to

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[4] Wasserman and Faust (1994) is the standard text for social network analysis.
[5] This cellular structure can be considered one variant of the "village" networks described in Siegel (2005).
[6] Calculated using Agna 2.1.1. Other measures, such as betweenness centrality, do yield a lower measure for network A. However, one can easily construct cellular networks where betweenness centrality fails as well.

share information and resources. Second, captured individuals can share information about those to whom they are connected. Since it is a given that members of a cell share information and can compromise one another, the relevant question might be how interconnected are the cells that make up an organization? One potential way to avoid the problem of intra-cell connections distorting the data is to treat cliques as individuals, and then to assess the average centrality of across cliques in a network.[7] However, doing so requires an arbitrary application of one clique size to an entire organization. This application is problematic where there is not a standardized cell size, where cells have different sizes according to their operational role, or where cell size changes over time.

A better approach is to consider the average number of connections cell members have to network members outside their cell. This requires importing information not contained in the connectivity matrix, i.e. the boundaries of the cells. Rather than relying on purely structural information to determine the interconnectedness of the organization, we first identify the smallest relevant function units, and then ask how connected these units are. Note that the higher this measure, the greater a group's the ability to share information, and the greater the risks associated with the compromise of any one individual. Thus the things that matter about interconnectedness do increase monotonically with this measure.

Now, this definition immediately begs the question of what is a cell. For example, is the core leadership of Al Qaeda properly considered one cell, or a tightly interconnected group of cells? We require a functional definition of a cell, which we get by asking what ultimate purpose connections serve in a covert enterprise. The answer is that connections facilitate sharing of information and resources, which in turn facilitate actions. Thus a cell is best understood as an individual or group of individuals that take consequential actions. Khalid Sheik Mohamed would be considered a cell as he traveled the world providing financial resources and information to support attacks from 1995 until his capture in 2002. Likewise the core group of Madrid bombers would be considered a cell. However, the individual Madrid bombers would not be considered cells as they did not take actions that had impact beyond the actions of their larger cell. The cell, in other words, is the smallest independent functional unit.

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[7] In formal network analysis terms an n-clique is a group of n members all of whom are connected to each other member of the n-clique.

Thus interconnectedness is defined as the average number of connections that minimal functional units in an organization have with other such units, the mean degree centrality of minimal functional units.

Hierarchy

As with interconnectedness, there are a number of different ways in which the level of hierarchy or centralization can vary.[8] We can ask where do orders about attacks come from, who chooses what targets to attack, when, and how? We can ask how the distribution of resources such as expertise, money, and personnel is coordinated, is the distribution centrally controlled, or do cells coordinate through another system such as a market? We can consider how much autonomy cells have in how conducting their affairs, both small scale attacks and day-to-day procedures? Or, like Kenney (2005), we can ask how many levels of authority exist within an organization? Clearly the answers to these questions need not point in the same direction. For example, an organization may give its cells great autonomy to conduct operations, but tightly control financial resources. In this situation, it is not clear if we should consider this a hierarchical organization. After all, making continued access to funds conditional on certain behaviors translates control over financial resources into influence without establishing observable authority structures.[9]

Assessing the degree of hierarchy in a covert organization then is no easy task. Finding the appropriate way to think about this dimension of organizational design requires asking again what are the consequences of variation in hierarchy? Here it is worth examining how the hierarchy operated in one highly successful terrorist organization, Hezbollah. Rangstorp (1994) reports that decisions to initiate kidnappings were taken at the highest levels of the Hezbollah leadership. Once the key decisions were made, the profession and nationality of the future hostage, senior decision makers would often delegate the details of

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[8] Discussing the decentralization of Al Qaeda since the loss of its Afghan sanctuary, Pillar (2004) notes that initiative, direction, and support come from more widely scattered locations than it did before.

[9] However, this ability is limited by agency problems where the behavior of those receiving the resources cannot be perfectly monitored or where they cannot be credibly punished for deviant actions. This dynamic is explored in detail in Shapiro and Siegel (2005).

the operation to the leaders of Hezbollah's regional Special Security Apparatus. (Rangstorp 1994, 308-310.)

Contrast this process with one in which a *jihadi* public intellectual issues a call for attacks against countries involved in the U.S. coalition in Iraq, as happened before the Madrid bombing. (Brynjar and Hegghammer 2004) In one sense, the two processes were quite similar. Leaders identified the target, followers worked out the details and carried out the leaders' intent. But, as is intuitively obvious, there is a crucial difference; the Hezbollah leaders engaged in a revocable delegation of operational autonomy, they maintained ultimate control. Therein lies the critical dimension of hierarchy. It is not about an organization chart, or the number of individuals through whom information must pass, these are surface features. The salient difference is control. American special operations forces operating in a dispersed fashion in Afghanistan remained part of a hierarchical organization because they were under the control of a higher decision making body. Local *jihadi* cells operating in diaspora communities in Europe are not part of a hierarchical organization to the extent that they are not under the control of any such body.

If the key factor in assessing hierarchy is understanding control there remain two questions: who has control, and over what? Terrorism is one tactic among many that are available to rebellious movements seeking either to take control of the state or to compel a state to take certain actions. (Laitin and Shapiro 2005, Pape 2005). Given this observation, we can define an organization as hierarchical if those providing political and ideological guidance for the movement can exercise meaningful control over operational elements. This definition nicely encompasses a variety of movements, some of which engage in terrorist tactics, some of which do not. For example, the civil rights movement and counter-movement would be characterized as non-hierarchical in that both movements' ideological leadership provided guidance, but did not exercise meaningful control over functional units. Within this movement, however, the Freedom Riders would be characterized as hierarchical because that organizations' political leadership exercised clear control over where individuals went and how they operated. In the terrorist realm, Hamas would be characterized as hierarchical because the political leadership exercised tight control over operational elements, modulating both ideology and the use of violence in accord with political objectives. (Mishal and Sela 2000, Gunning 2002) For the remainder of the article the political and ideological leadership will be referred to as the center. The question of what is to be controlled can be

broken down into two components. First, control can be exercised over operations, meaning both targeting and the procedures by which the operations are carried out. Second, control can also be exercised over resources, meaning financial resources, information, and personnel. Thus we are left with two variables: control over operations; and control over resources.

By identifying who controls resources and who controls operations, we can generate a four-level ordinal scale of how hierarchical an organization is. For consistency, I call a hierarchical organization centralized and a non-hierarchical organization decentralized. This fits nicely with the notion that the critical element of hierarchy is central control. Thus we have the following scale:

- An organization is a *centralized* when the center directly controls operations and resources.

- An organization is a *de facto centralized* when either: (1) the center controls resources, delegates operations, but has a credible ability to monitor operations and withhold resources if operations are not carried out to its liking; or (2) the center controls operations, delegates resource procurement, but has a credible ability to engage in violence against factions.

- An organization is *de facto decentralized* when either: (1) the center controls resources, delegates operations, but does not have a credible ability to monitor operations; or (2) the center controls operations, delegates resource procurement, but does not have a credible ability to engage in violence against factions. In this case, control is exercised only at the whim of the factions.

- An organization is *decentralized* when the center provides only ideological guidance and cells self-fund or coordinate among themselves regarding operations and resources.

Thus we have a partial ordering in which the two poles are clear. However, there is no *a priori* way to decide which form of *de facto cenetralization* is more hierarchical, and the same is true of the two forms of *de facto decentralization.*

Specialization

The level of occupational specialization in a group usually refers to the range of tasks each tightly interconnected unit, or cell, is expected to undertake. PIRA Active Service Units (ASU) reportedly were highly specialized into the 1990s, focusing their training on specific tasks such as armed robbery, bombings, logistical operations, or intelligence. (Horgan and Taylor 1997, 13, 20-21. Jackson et. al 2005, vol. 2 123-125. Silke 1998, 350.) By contrast, cells in loyalist paramilitary organizations such as the Ulster Volunteer Force (UVF) typically engage in a wide range of activities, including many commonly associated with traditional organized crime. (Silke 2000) In between these poles is an organization such as Al Qaeda in the 1990s were individual specialists were brought in to provide specific skills but were not regular members of the cells conducting attacks.[10] Such an organization would be considered specialized in so far as a wide variety of skills are not distributed in the average cell.

Successfully conducting a terrorist campaign requires a host of activities including fundraising, procuring weapons, collecting intelligence, recruiting new members, engaging in publicity and media relations, training, firing weapons, building bombs, and maintaining security. Because these activities are useful only in combinations, the level of specialization is limited by the need to coordinate activities, and so is ultimately constrained both by the levels of interconnectedness and hierarchy in an organization, and by the operational environment in which coordination must be achieved.

A number of constraints on specialization can be identified. For example, a decentralized organization will find specialization sustainable in only the presence of way of achieving coordination between cells. Because such coordination requires a good deal of information sharing, it places limits on how cellular an organization can be and involves significant security risks. Thus specialization in decentralized organizations is only feasible, in the sense that it meets a certain organizational aspiration level, when interconnectedness is not too low and when there is a secure location or communications channel where information can be exchanged. By contrast, a hierarchical organization can support specialization even with low levels of interconnectedness, so long as the hierarchy is able to

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[10] In the East Africa embassy bombings, the explosives experts arrived once the surveillance and planning was compete, prepared the weapons, and were ordered to return to Afganhistan before the attack was carried out. Frontline. "Notes on the Interrogation of Mohammed Saddiq Odeh." In *Hunting Bin Laden*. Available at http://www.pbs.org/wgbh/pages/frontline/shows/binladen/bombings/interrogation.html. Accessed May 28, 2003.

appropriately allocate resources without generating unacceptable security costs from the interconnections that result.[11]

Low specialization by contrast is feasible in any organizational form, but may contribute to corruption within an organization and hence hinder the attainment of political goals. Silke (1998, 2000) identifies this dynamic within loyalist paramilitary organizations. He also notes that specialization is more difficult to achieve in smaller organizations, and so corruption should, all other things being equal, be more of a problem for smaller groups. We might also expect that less interconnected organizations would have a harder time maintaining operational specialization. Essentially the ability to communicate and coordinate among specialized cells is inherently reduced by the desire to limit interconnections, as is the group's ability to learn from the experiences of its cells. (Jackson et. al. 2005, 130) Facing this constraint, cells would reasonably opt to develop internally the ability to conduct activities that are required, but are hard to get done by relying on the hierarchy.

Given the potential endogeneity of specialization to the other dimensions of organizational design, its use as a variable dimension of organizational design seems problematic. Moreover, most of the empirical literature does not distinguish between specialization by individuals and specialization within units. Thus when an author rights that a group provides specialized training, it is not clear if these individuals will be operating together in a specialized cell, or will work with specialists in other functions, leading to a non-specialized cell. For these reasons, specialization will not be considered as an independent dimension of organizational design, but will be treated as an existing parameter that can influence the costs and benefits to different forms of organization. The plausibility of treating specialization as an exogenous parameter depends in large part on the time scale over which organizational change is being considered.[12] Skills such as armed robbery take time and training to develop. Over a time period of a few months, it is unlikely that a group can alter the level of specialization in its cells.[13] However, over a period of years, the level of

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[11] Al Qaeda's dispatching of experts in bomb-making in the late 1990s is an example of specialization in a hierarchical, loosely interconnected organization.

[12] I thank Jonathan Bendor for pointing this out.

[13] This argument is less likely to hold where groups are able to rapidly recombine cell members. Note that such reorganizations creates additional interconnections, and so entails a security costs for organizations that have few interconnections between cells.

specialization is properly considered a choice variable, albeit one whose range is limited by the other dimensions of organizational design.

Even though the analysis above suggests a continuous operationalization for interconnectedness, and an ordinal scale for hierarchy, I illustrate the utility of considering these choice variables as independent by placing groups into a 2 x 2 table in figure (1). As figure (1) shows, groups have used different combinations of hierarchy and interconnectedness. The next section considers the costs and benefits of choosing these different combinations.

	Centralized	Decentralized
Cellular	Hamas (post 1985), PIRA (1970s re-org), Al Qaeda pre-2001	PIRA (1990s), ELF, Christian Identity Movement
Interconnected	Fatah, JI	Al Qaeda post-2001, ETA (1960s)

Figure (1): Organizational design of different terrorist groups.

Section II: Costs and Benefits of Design Choices

An interesting pattern emerges from a review of the organizational histories of Al Qaeda, Hamas, Hezbollah, JI, early Marxist factions, the PIRA, and the Red Brigades: all of these groups initially chose a centralized, interconnected organization and only shifted under government pressure.[14] This initial organizational choice makes *a priori* sense in that a centralized, interconnected structure offers leadership the ability to control their organization while realizing the gains that can come from direct coordination at the operational level. This initial arrangement also makes sense if we believe organizations

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[14] The only counter-example to this pattern that I have identified is ETA, whose military activities began with the actions of independent armed subunits. The movement's center tried and failed to centralize authority over theses units several times in the face of government crackdowns. This suggests that concerns with the security costs of centralization were trumped by the desire to control the use of violence. (Zirakzadeh 2002) For more on ETA see Wievorka (1983) and de la Calle and Sánchez-Cuenca (2004).

evolve organically as influential individuals, the original political and ideological leadership, recruit within existing social networks. This section considers the costs and benefits of deviations from a centralized interconnected organization along each choice variable, illustrating these costs and benefits with examples where available.[15]

In a general sense, movement along each dimension carries different consequences. Decentralization exposes groups to agency problems either when the preferences of lower-level leadership do not match those of the center, or when the center and lower-level leaders have different information about the state of the world. However, decentralization may be beneficial by making it harder for government to uncover exploitable links between individuals. (Pillar, 2004). In a very interesting model, Baccara & Bar-Isaac (2005) show that where the mere fact of participation increases individuals' chances of detection, hierarchical control may be better than decentralized coordination because it involves a lower chance of compromise for the average member of the organization. They also find that hierarchy can be very efficient where an organization can shield some individuals from detection, perhaps by moving them to a sheltering state as Hamas did in Lebanon and the PIRA did in the Republic of Ireland.[16]

On the other dimension, increasing interconnectedness creates security concerns as the more connections between cells, the worse the consequences of any one individual being arrested.[17] Clearly some type of limitations on communications is necessary and advantageous, to a point. However, those seeking to achieve revolutionary changes in society through violence have long observed a tradeoff between the security that comes with a

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[15] There is a definite issue of sample bias because existing empirical studies cover only relatively successful terrorist groups. No one has yet conducted a systematic study of groups that fail rapidly. Fortunately, such groups appear to be a small section of the population of actual terrorist groups. Of the 77 groups identified in Crenshaw (1991), only 11 failed in their first five years. On Al Qaeda see Pillar (2004) and Gunaratna (2002, 2004). On Hamas see Mishal and Sela (2000). On Hezbollah see Rangstorp (1994), Harik (2004), and Jackson (2005). On JI see Jackson (2005) and reports by the International Crisis Group. On the early Marxists see Newell (1981). On the P-IRA see Horgan and Taylor (1997), Silke (2000), and Jackson (2005). On the Red Brigades see Wieviorka (1993) and della Porta (1995).

[16] These results comes from a model in which detection probability is independent of position in the hierarchy. It is not clear how relaxing this assumption would alter the results.

[17] Siegel (2005) explores the interaction of network typology and vulnerability to government action in great detail. Fearon (2005) identifies the conditions under which this dynamic limits the growth of insurgencies. His analysis posits what is in effect an all-channel network, in which every member has information on every other member.

cellular structure and the inevitable disconnection from the population being influenced. (Newell 1981) This disconnection places cellular organizations at risk for losing touch with the population they claim to support, a common factor in failure of terrorist movements, and also increases the chances that the organization will mistake tactical success for strategic achievements. (Crenshaw 1991, Laitin 1995, Petersen 2001) Moreover, reducing interconnections limits organizations' ability to deal with unexpected circumstances at the lowest possible level, increasing the cognitive demands on senior leaders. (Galbraith 1974)

Keeping these generalities in mind, and treating interconnectedness as a dichotomous variable that takes on the values of *cellular* or *interconnected*, there are seven deviations from the hierarchical interconnected organization to consider. For each I list some costs and some benefits.

Cellular, Centralized

The primary cost identified with moving to a less interconnected, more cellular organization rests in a groups' disconnection from their target population, as discussed above. The primary benefit is a reduced vulnerability to compromise. After the P-IRA adopted a more cellular organization in the late 1970s, in response to a series of major compromises, the number of individuals identified following the average arrest dropped dramatically. (Horgan 1997, 21) This form describes the P-IRA from the late 1970s until the early 1990s and Hamas until, possibly, very recently.

Interconnected, de facto Centralized

The primary cost in ceding direct control is the agency problem that emerges. The center must be able to monitor the actions of nominally independent cells. This problem is mitigated here as interconnections between cells provide multiple pathways for monitoring. The main benefit to this form is that, as noted above, it is harder for government to uncover "exploitable links", i.e. links to people doing things that are unambiguously terrorist in nature. This is particularly favorable for groups trying to provoke the government into over-reaction. Assuming government intelligence analysts are on the efficient frontier in their use of information, making it harder to uncover links implies that government analysts must turn down their sensitivity to avoid false negatives. But, this necessarily implies increased false positives, uncovering more erroneous links. These false leads will in turn generate more bad

arrests, leading to an angered community, leading to more support and recruiting opportunities. This organizational form may describe the Palestinian Islamic Jihad whose leaders reportedly hire individuals to organize suicide attacks and then do not rehire those individuals if they do not perform as desired.[18]

Cellular, fe facto Centralized

Cellular organizations are more secure, this is the benefit of this organizational form, but face a more challenging problem of monitoring and control. In the extreme case, their ability to monitor may be limited to observing the consequences of their cell's actions, without knowing whether those actions were generate by the cell's choices, or by interactions with the government. (Shapiro 2005, Shapiro and Siegel 2005) This type of organization is most likely to appear attractive when the center believes that the membership shares their preferences and has a similar view of the world. Note that the costs of this organizational form are not simply that the cells may do too little. They may conduct politically counter-productive attacks, a problem the PIRA experienced after giving their Active Service Units (ASU) more autonomy in the 1990s, again in response to a government crackdown. (Horgan and Taylor 1997, 23)

Interconnected, de facto Decentralized

In this organizational form, control is exercised only so long as the leadership's desires please the cells. This can lead to a trap that concerned early Marxists leaders wherein an organization is forced to adopt more violent tactics in order to retain the allegiance of violent cells. (Newell 1981) Della Porta (1995) observes a similar trap in her study of Italian and German left wing terrorist groups. These groups' dependence on violent factions for cooperative participation created endogenous pressure for more violence, even when such violence was not politically ideal. However, conditional on being *de facto decentralized,* an

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[18] This according to the sometimes-reliable *DEBKA-Net-Weekly*. See "Bounty for Murder Offered by Iran's Revolutionary Guards, Syria, Hizballah," *DEBKA-Net-Weekly*, 26 February 2004. Available for at http://www.debka-net-weekly.com/.

interconnected organization can achieve coordination between specialized cells, provided they have safe haven or secure communications channel for doing so.[19]

Cellular, de facto Decentralized

In this organization the center only maintains control at the whim of factions, gains additional security, but loses the advantages of decentralized coordination. The real problem with this organizational form arises from the second-order effects of removing the option for decentralized coordination between cells. Because the central leadership cannot effectively mandate coordination between cells, units in this organization have strong incentives to engage in more multi-tasking than if they were interconnected. Such multitasking is accompanied by increased risk of corruption, as has been an enduring problem for Loyalist paramilitaries in Northern Ireland. (Silke 1998, 2000). This type of organization is posited by some for Al Qaeda in the current period where local cells operate independently, under the nominal guidance of a central leadership.

Interconnected, Decentralized

This is the structure posited by most analysts for Al Qaeda and affiliates since the U.S. invasion of Afghanistan. This organizational form is useful for conducting operations because members of the network can form ad hoc coalitions wherever they happen to be and have the connections to access a wide variety of skills. Lopez (2005) describes Abu Musab al-Zarqawi's development of such an interconnected, decentralized organization between 2000 and the present. The problems with this organizational form are the lack of control and the vulnerabilities created by interconnections. A review of the prosecution of 143 individuals sentenced for involvement in terrorist plots involving Al Qaeda and affiliated groups reveals the prosecution frequently relied on the cooperation of one member of a large network, typically someone who was not operationally essential to plot.[20] Indeed, the predominance of link analysis tools such as Analysts Notebook in the practice of intelligence

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[19] The potential for conflict between the center and cells is explored in Siqueira (2005) who analyzes ideal government strategies given whether the actions of the political center and the militant faction support each other or undermine each other.

[20] Based on review of judicial outcomes for all captured individuals in Sageman's (2004) dataset on the global salafi jihad.

collection against terrorist organizations provides *prima facie* evidence that interconnections are risky.

Cellular, Decentralized

Finally, there is the leaderless resistance model advocated by both far right organizations such as the White Aryan Resistance, and far left organizations such as the Earth Liberation Front. (Gruen 2004) The benefits of this form lie in the extreme security it provides, meaning movements organized in this way can operate in very hard security environments such as developed countries with competent security forces. The cost of this organizational form is that groups cannot mount coordinate campaigns or develop cumulative training programs for their members. No movement so organized has achieved significant political changes.

Section III: Preliminary Hypotheses

A critical point to keep in mind when considering organizational design decisions is that terrorist groups don't need to produce violence, they need to produce controlled violence. In most any struggle, there is a level of violence, or choice of targets, that is counterproductive. (Crenshaw 1991, Kalyvas and Sánchez-Cuenca 2005, Shapiro 2005) A decentralized, networked group may be able to maximize the total amount of violence, but it is not clear that it will be able to reliably produce the optimal level of violence. Presumably the trade-off between control and productivity depends on the political situation. For Islamist groups with non-negotiable goals, maximizing violence may make sense. However, for groups like MILF with clear territorial ambitions, being able to turn violence off may be just as strategically important as being able to produce it. There is no one unambiguously best way to evolve for covert organizations. Each movement involves tradeoffs. Our goal should be to understand the factors that push group to make these tradeoffs in a particular way. With this in mind, a few preliminary hypotheses (conjectures) arise naturally out of the analysis above:

H1: Hierarchy is preferred form of organization for leaders. As such, if the center has a safe physical location to move to when government increases pressure on a group, then the

group will centralize and the center will use its increased control to stamp out vulnerability-creating practices. If no safe haven is available, the group will reduce interconnections before reducing hierarchy. This pattern occurred with the PIRA which reduced interconnections in the 1970s, and only reduced hierarchy in the 1990s, when coordinating militant activities from Republic of Ireland territory became more costly because of the political situation.[21]

H2: Design decisions are constrained by the source of a group's resources. If a group depends on raising funds from sources that requires coordinated effort, such as a diaspora populations, then the center can maintain de facto control so long as it can monitor the cells, and so there is a lower bound on decentralization.[22] The same is true when groups rely on a sole source of external funding, and that source prefers to deal with a centralized organization rather than with a large number of independent factions.[23] Where fundraising through decentralized means such as ad hoc criminality is feasible – where the burden of criminality is not born by a group's supporting population for example – then decentralization is less attractive to a center seeking to retain control, and so groups are more likely to reduce interconnections to mitigate security concerns.

H3: Organizational design decisions depend on the type of people available to an organization. Where an organization has a highly trusted membership, decentralization and reduced interconnections are more attractive than where an organization is unsure of the commitment level of its members.

H4: The type of people in an organization may be endogenous to that organization's design. Greedy individuals are more likely to join and organization like the UVF where there are clear opportunities to get wealthy. These individuals will be less likely to join highly

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[21] That the Red Brigades did not have a sanctuary but still chose hierarchy in response to government pressure is not dispositive of this hypothesis. It could be that they made a mistake, as suggested by the petering out of their campaign. I thank Jonathan Bendor for pointing this out.

[22] Diaspora fundraising is most effective where subtle coercive efforts are made to pressure a community. For example, La (2004) describes coercive fundraising by the Liberations Tigers of Tamil Eelam (LTTE) in Tamil communities in Canada.

[23] Weinstein (2005) identifies this dynamic among rebel organizations relying on external sponsors.

interconnected structures that are riskier, require them to depend heavily on others' discretion, and offer fewer opportunities for personal gain.[24]

H5: Groups in an uncertain operational environment are more likely to be interconnected. When "exceptions", unexpected circumstances, become too prevalent, they overwhelm the hierarchy's ability to deal with them. Under such conditions, the organization can reduce uncertainty by: (1) creating slack resource such as security bureaucracies; (2) reducing specialization to reduce the need for coordination; and (3) creating lateral relationships, interconnections. (Galbraith 1974)

Because these hypotheses (conjectures) are generated by a verbal model, it is hard to be sure that they account for all the potential interactions between the various costs and benefits identified above. The next step in the project will be to formally model these organizational design decisions in order to validate these conjectures and generate more precise testable hypotheses.

Section IV: Conclusion

As this analysis has shown, it is far from clear what pressure on Al Qaeda and affiliates portends for how they are organized. The optimal adaptations to government pressure depend on a number of factors such as the ideological commitment of Al Qaeda's membership and the availability of safe havens or safe communications channels. Government knows little about the first of these factors. What is clear is that the historical pattern of how terrorist groups evolve in response to government pressure is at odds with what many analysts think going on with the current islamist threat. This dramatic difference calls for a clear explanation of what really pushes this type of organization to respond in certain ways.

Understanding terrorists' organizational adaptation will help government look down the game tree to choose appropriate counter-terror tactics. In so far as a tactic will reduce

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[24] *H2, H3,* and *H4* are similar to arguments made in Weinstein's (n.d.) study of the organization of rebel organizations. This analysis draws on numerous discussions of these issues.

the rate of attacks it may seem good. But tactics that reduce a group's operational capability by driving the group to decentralize may in turn make it harder to resolve the conflict. In the final accounting, this may actually drive up the net number of attacks a society will suffer during the lifespan of a terrorist group.

This analysis has developed and operationalized a framework for thinking about the organizational adaptation of covert groups. The concepts of interconnectedness and hierarchy defined above are measurable from extent data, encompass a wide variety of groups, and facilitate predictions about how groups will evolve. The next step is to formalize this analysis into a model of organizational adaptation between a covert organization and government. The model will help to make sure that the hypotheses suggested above are internally consistent and to generate additional testable hypotheses.

There exists a good deal of confusion about the likely consequences of terrorist group adaptation and much of what has been written does not pay adequate attention to organizational constraints facing all groups. In the end, I believe that this confusion comes from conflating a lack of demonstrable results for government with success for terrorist organizations. Government is perceived as effectively fighting the problem when it can point to the disruption of a specific group or plot. Yet, government policy that forces a terrorist group to adopt a cellular decentralized structure reduces government's ability to identify a definite adversary, point to the disruption of specific plots, and develop metrics to measure the conflict. However, such organizational changes also hinder the terrorist group's ability to conduct operations and modulate the use of violence, thereby making it more likely the terrorists will fail to achieve their political goals. Thus while government effectiveness may equate to terrorist failure, perceived government ineffectiveness does not necessarily equate to terrorist success. It is useful to keep this distinction in mind when considering the adaptation of terrorist groups. Changes that make it harder for government to point to clear operational successes, may never-the-less favor the ultimate failure of the terrorist campaign.

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