

Colin King • Clive Walker • Jimmy Gurulé  
Editors

# The Palgrave Handbook of Criminal and Terrorism Financing Law

Volume 2

Chapter 39 - Pages 945-966

palgrave  
macmillan

62. The case is pending and registered at the Court's docket with the number C-79/15 P—*Council v Hamas* [2016] ECR II-722.
63. Case T-400/10 *Hamas v Council of the European Union* [2014] ECR II-1095.
64. *Council of the European Union v Hamas* (n 62) Opinion of the Advocate General Sharpston, 22 September 2016.

**Luca Pantaleo** holds a PhD in International and EU Law (2013) from the University of Macerata (Italy), where he had previously obtained an MA in Law (2009). He has also worked at the Asser Institute, where he served as Senior Researcher and Academic Coordinator of the Centre for the Law of EU External Relations (CLEER). Previously, he had worked at the University of Luxembourg as Senior Researcher (Postdoc). In the course of his academic career, he has been appointed as a visiting researcher in several institutions, such as the Pontifical Catholic University of San Paulo/PUC SP (Brazil) and the Max Planck Institute for Comparative Public Law and International Law (Heidelberg, Germany).

# 39

## Applying Social Network Analysis to Terrorist Financing

Christian Leuprecht and Olivier Walther

### Introduction

This chapter posits network science as a method to improve our understanding of the way terrorists, criminals and their facilitators exploit the global marketplace. In an age of globalization, the magnitude and velocity of terrorism and crime, driven by interconnected economies and advances in communication and technology, have resulted in significant profits and violence.<sup>1</sup> The White House's 2011 *Strategy to Combat Transnational Organized Crime* (SCTOC) concludes that 'criminal networks are not only expanding their operations, but they are also diversifying their activities. The result is a convergence of threats that have evolved to become more complex, volatile, and destabilizing.'<sup>2</sup> Convergence has also improved groups' ability to evade official countermeasures, overcome logistical challenges, and to identify and exploit weaknesses and opportunities in the state system.<sup>3</sup>

Illicit financial networks are, by their very nature, difficult to detect—as the relative dearth of prosecutions shows—and, therefore, difficult to study. Much of the information on individuals and their activities is either classi-

---

C. Leuprecht

Department of Political Science, Royal Military College of Canada,  
Kingston, ON, Canada

O. Walther

University of Florida, Center for African Studies, College of Liberal Arts and  
Sciences, Gainesville, FL, USA

fied or unknown. Nonetheless, tracking how terrorists raise, move, store and use money is fundamental to deter terrorist networks. Policy makers and security practitioners strive to know how networks originate, operate and change over time. To explore this issue, this chapter draws on evidence from select Hezbollah and Al-Shabaab financing networks.<sup>4</sup> Although the evidence is limited, it demonstrates that the application of Social Network Analysis (SNA) to the study of terrorist financing and money laundering advances the current state of knowledge in this notoriously difficult-to-study field.<sup>5</sup>

The chapter advances three propositions. First, a network's structure matters because it dictates the flow of resources and information: centralized social networks are more efficient at disseminating and controlling resources and information, decentralized networks are more resilient to threats because actors determine their own path rather than depending on a single central authority. Second, SNA can identify the structural roles of the most prominent actors in a network and whether their function, such as fundraising, informs structure. Whether key individuals serve as hubs or as brokers is of particular interest. Hubs are surrounded by many friends and associates, while brokers bridge actors that otherwise would be disconnected. Third, building on analysis of the overall structure of the networks and of the structural roles of the actors, SNA holds out considerable promise in disrupting terrorist financing and money laundering.

The Al-Shabaab case studies suggest that a network's structure appears to be determined by its function: the two Al-Shabaab financing networks share a hub structure. In the case of Hezbollah, SNA confirms not only a structure similar to that found in the Al-Shabaab cases but also the relative autonomy from Hezbollah headquarters that local fundraising networks enjoy. That finding implies a paradigm shift: Hezbollah is no less a terrorist organization than an organized crime syndicate. Transnational organized crime is typically about nodes being connected to many others in the network. Yet, Hezbollah fundraising networks allow such connectivity because of the group's high levels of mutual trust and familial relationships. This creates a vulnerability that can be exploited by law enforcement and intelligence organizations.

## Social Network Analysis: A Relational Approach

SNA is the study of the individual members, represented by the nodes of the network, and the relationships between these members, represented by the links. The pattern of exchanges between nodes over time is the bedrock of

network analysis.<sup>6</sup> As a relational approach to social interactions, SNA has emerged in the literature as an important method of analysing and disrupting terrorist networks.<sup>7</sup> SNA maps out ties between the various nodes in the group as they are, rather than how they ought to be or are expected to be. Applied to various groups across different parts of the world, this approach makes it possible to determine the structure and function of both the network as a whole, and the role of each person in the group in relation to others.<sup>8</sup>

Network structure may arise by design as, for example, when a terrorist group constructs an organizational chart to manage coordination and governance. However, many real-world networks are constructed because of the accumulation of pairwise connections, each of which is made locally by the two individuals concerned and sometimes with an element of serendipity. The properties of such a network are emergent, but the resulting structure is also constrained by purpose and so can be revealing of 'what works.' If the network does not contain the required actors, or if they cannot communicate as required, then the network is unlikely to be effective.

The illicit activities pursued by terrorist organizations necessitate secretive conduct on their part that imposes limitations on the collection of data. The usual methods employed in qualitative studies are inapplicable when subjects are inaccessible for interviews, and the publically available sources are thin. Another major limitation is that actors studied in terrorist networks are statistically dependent by nature, which had led SNA to develop probability models that differ from traditional econometric models. This study is limited to data from open sources such as court records, newspaper articles, case documents, secondary source material and the Internet. Interactions were defined as meetings, personal relationships or the exchange of goods as outlined in the sources. Only links that could be reliably verified through triangulation among several sources have been included; consequently, some vague but possibly significant links have been omitted and the networks as depicted may not be comprehensive.

These scope conditions inherently limit the number of nodes included in this study as well as the available evidence on edges that connect them. Still, some reasonably distinct patterns emerge that generate robust insights about the growth and membership of terrorist networks, interactions between nodes and their connections to activities, and the methods by which they can be deterred and dismantled, insights that lend themselves to scrutiny through future research.

Many different types of networks—chain, hub (star), multi-player, all-channel (clique)—have been identified in the literature on SNA and terror depending on their global architecture. In this chapter, we are particularly

interested in nodes, or small clusters of nodes, that sit at the centre of three or more other nodes, which themselves have very few or no links. These centralized nodes are commonly referred to as hubs, and they occupy a position of influence and power because of their roles in information or material flow. The star network, in which a single node acts as a conduit to transmit resources and information to many other nodes, is perhaps the best-known example of a hub network.

Three inter-related concepts are useful in describing and analysing how nodes influence the movement of information and resources within and between networks: degree centrality, 'betweenness' centrality and brokers. Degree and betweenness centrality are measures of the quantity versus the quality of a node's connections within a network. Brokers are conferred positional advantage in a network insofar as they bridge structural holes—areas of low density in a network—by virtue of having greater access to information, opportunities and skills.<sup>9</sup> Morselli's study of members of the Hell's Angel's motorcycle gang in Quebec found that elite members of the group were directly connected to only a few other members of the network, who were efficient in transmitting information to the rest of the gang. These actors simultaneously expressed low degree centrality and high betweenness centrality.<sup>10</sup> These are precisely the traits of a broker: a node with few but influential connections. Ergo, an 'ideal broker,' is an autonomous link between a single node in each of two networks where such a link constitutes the only connection between them.<sup>11</sup>

Brokers are at an advantage because they can (1) transfer resources between two disconnected actors, (2) facilitate matchmaking between two parties to the benefit of each other or (3) coordinate the activities of third parties without creating a direct relationship between them.<sup>12</sup> Especially in illicit situations, members in each network can avoid making more connections to illicit individuals than necessary, which might increase their chances of detection,<sup>13</sup> while maximizing opportunities to further their objectives through potential access to the resources of the other group via the broker.<sup>14</sup> In turn, the autonomous ideal broker can act opportunistically, in this case by connecting transnational legal and illicit markets. As a result, brokers tend to maximize monetary returns from illicit activity.<sup>15</sup>

The primary objective of the networks in this chapter is to generate funds to remit abroad. We might thus expect them to display the characteristics associated with fundraising networks: hub structure, brokers with high betweenness centrality and low degree centrality, international linkages, no intent to commit domestic attacks, and remittances to the home country.<sup>16</sup>

### Al-Shabaab Case Study

The Al-Shabaab Minneapolis Fundraising Network (MFN) depicted in Fig. 39.1 appears to consist of two hub networks situated in Somalia and the United States, respectively. Beginning in September 2008, Amina Farah Ali (AFA) of Minneapolis was confirmed to have been in contact with an Al-Shabaab militant in Somalia, described in court documents as 'UC1' 'Unindicted Conspirator 1' (UC1), a financial representative for the organization who was promoted to an administrative governor of several Al-Shabaab-controlled regions in February 2009.<sup>17</sup> Court documents identify four other contacts in Somalia (UC2–UC5) who were subordinates of UC1 and who do not appear to have interacted with one another, three of whom oversaw accounts to which AFA transferred funds.<sup>18</sup> The account numbers corresponding to these individuals were supplied to AFA by UC1 with whom AFA was in contact repeatedly between September 2008 and July 2009. Court documents have AFA corresponding directly with two of these subordinates, interacting with one only once in May 2009, and contacting the other in October 2008 to arrange for him to be a guest speaker at a fundraising teleconference that same month.<sup>19</sup>

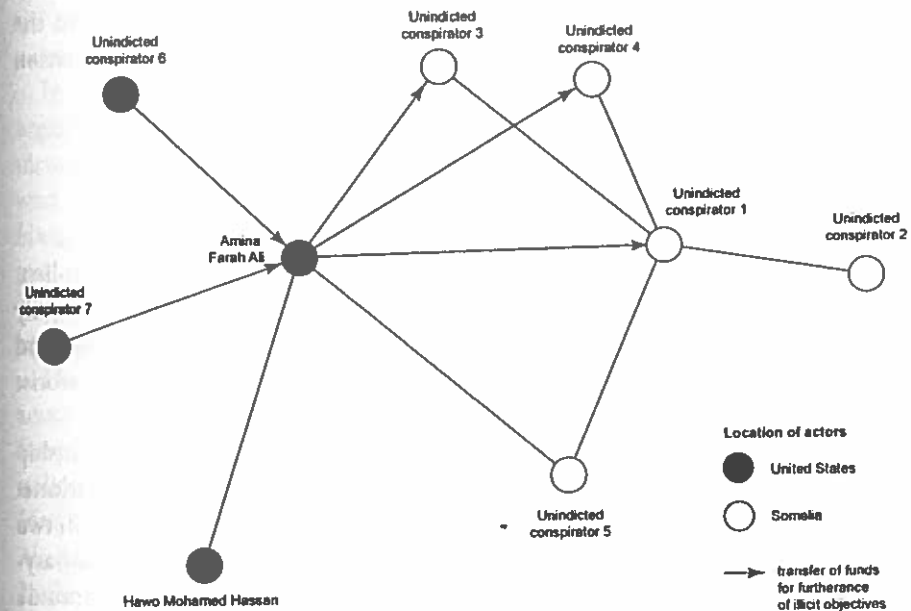


Fig. 39.1 Minneapolis Fundraising Network. Source: Leuprecht and Hall (n 4) 107

In America, AFA was in contact with three individuals, one of whom assisted with bookkeeping and recording pledges (Hawo Mohamed Hassan), while the other two collected funds from donors and directed them to AFA for transfer to Somalia (UC6, UC7). One of these actors was explicitly instructed by AFA to collect funds under false pretence, while she tasked the other with collecting pledges made during one of the teleconferences.<sup>20</sup> The available information suggests that these three nodes never interacted with one another. The MFN, thus, appears to be composed of two hub networks with AFA as the broker between the Minneapolis and Somali hubs. While the individuals in Somalia may have other unknown functions in the larger Al-Shabaab network there, the conspirators in America appear to be concerned exclusively with supplying funds to be used at the discretion of Al-Shabaab operatives in Somalia.

In the Al-Shabaab cases, for instance, the main broker in the United States was primarily responsible for communicating with an Al-Shabaab leader in Somalia and relaying pertinent information to the rest of the American nodes. In one case, the group of contacts in Somalia appeared to form a hub-like structure of their own, while in both cases US-based nodes are arranged in a single hub pattern or multiple hubs, which are linked to each other by brokers. The broker between the American and Somali nodes need not be the same individual who brokers between US-based hubs. These 'hub' network structures 'introduce an element of hierarchy' to the network, with those positioned at the centre having access to information and control over the flow of information and resources.

## Hezbollah Case Studies

From March 1996 to July 2000, a network based in Charlotte, North Carolina, ran a highly lucrative cigarette-smuggling ring. It was a complex and highly active criminal enterprise that involved cigarette smuggling, marriage and immigration fraud, procurement of dual-use technology to advance terrorist ends, credit card fraud and material support of a terrorist organization.<sup>21</sup>

The network emerged with a small group of men connected by kinship who came to the United States in the early 1990s and settled in Charlotte. Mohammad Youssef Hammoud arrived in New York in 1992, along with two cousins, Mohamad Atef Darwiche and Ali Darwiche, and petitioned for asylum. They settled in Charlotte along with two of Mohammad Hammoud's brothers, Bassam Hammoud and Chawki Youssef Hammoud, who were already living in the area. The men later obtained green cards through

fraudulent marriages to US citizens. In 1998, Mohammad Hammoud married Angie Tsioumas, his manager at the Domino's Pizza where he was employed.<sup>22</sup> Tsioumas became heavily involved in the smuggling activities of her new husband and his family, and would indeed come to be seen as 'the brains of the operation' by investigators.<sup>23</sup>

This network operated a very successful cigarette-smuggling operation driven by differential tax rates on cigarettes between states which had the effect of evading tax. Members of the Charlotte Network would purchase cigarettes in bulk from wholesalers such as JR Tobacco Wholesale in North Carolina, a major tobacco producer who charged a mere \$0.50 per carton, often using pseudonyms and fraudulent credit cards, and sell them in Michigan where the tax rates at the time had been raised to \$7.50 per carton—but without a licence and remitting legislated taxes, which made the transaction illegal.<sup>24</sup> The quantity of cigarettes purchased always fell just below the threshold above which they would have to provide proof of licence as a wholesaler or distributor. The cigarettes were then loaded into rental vans or trucks and—to mitigate the risk of forfeiture in case of seizure—driven to the home of one of the conspirators or a rented storage space, where they would be stored before being reloaded and driven to Michigan. The scheme was as simple as it was lucrative: the Charlotte Network was earning an average of \$13,000 per vanload of cigarettes smuggled out of North Carolina.<sup>25</sup> In total, the members of the network purchased about 500,000 cartons of cigarettes, worth more than \$7.5 million.<sup>26</sup>

In addition to the cigarette-diversion ring, the network was involved in organizing multiple illegitimate marriages in order to obtain citizenship through the second major player in the Charlotte Network, Said Harb. Harb, who was connected to the group through a childhood friendship with Hammoud, is known to have arranged at least three sham marriages to bring members of his own family to the United States, as well as running an Internet pornography business and credit card fraud schemes in support of the cigarette smuggling.<sup>27</sup>

Harb also contributed a scheme to procure dual-use technology. He assisted another childhood friend, Mohamad Hassan Dbouk, to come to Canada from Lebanon. Dbouk, whom Harb would later testify had received extensive military training before coming to Canada, ran the Canadian arm of Hezbollah's dual-use item procurement efforts. Dbouk and his brother-in-law Ali Adham Amhaz were working under the direction of Haj Hassan Hilu Laqis who was at that time the chief military procurement officer for Hezbollah in Lebanon. Items destined for Hezbollah included GPS and surveying equipment, camera and video devices, computer equipment, night vision goggles,

and mine and metal detectors. Dbouk was deemed a pivotal Hezbollah operative; his application to become a martyr for the organization had been rejected on multiple occasions.<sup>28</sup>

SNA allows us to precisely visualize how the actors involved in the Hezbollah network are connected. As shown in Fig. 39.2, the Charlotte Network operated in three distinct spheres. The cigarette-smuggling scheme was mostly run by Mohamad Youssef Hammoud and his close family. Said Harb was involved in the cigarette smuggling and sham marriage schemes. Mohamad Hassan Dbouk and Ali Adham Amhaz in Canada operated the dual-use procurement efforts. Harb and Hammoud connect these three spheres and control the flow of information and resources. With the notable exception of Angie Tsioumas, whose role is analysed later, women were largely instrumentalized for the purpose of sham marriages with the main conspirators.

Alongside the Charlotte Network, Elias Mohamad Akhdar and members of his family were operating a similar and connected cigarette-diversion scheme from their bases in Dearborn, Michigan and New York. Beginning in 1996, the Dearborn Network began purchasing low-tax cigarettes and reselling them in Michigan at a substantial profit. The Charlotte Network was a major supplier of these low-tax cigarettes for the Dearborn Network. Interactions between Mohammad Hammoud and the Charlotte Network included over \$500,000 in cash transactions to Hammoud and at least 138 telephone calls.<sup>29</sup> The Dearborn Network also obtained cigarettes from another supplier, Haissam Nashar, and from the Cattaraugus Indian Reservation in New York State. In New York, Native American shops could buy a carton of cigarettes wholesale for a mere \$28, as compared to regular New York retailers who paid \$61.77.<sup>30</sup> Akhdar's common-law-wife, Brandy Jo Bowman, is an American Indian of the Seneca tribe, and her grandmother Carole Gordon headed the network's New York operations and facilitated Akhdar's access to untaxed cigarettes from the Cattaraugus reserve.<sup>31</sup>

To counter the introduction of tax stamps on packs of cigarettes in Michigan in 1999, the Dearborn Network instructed Hassan Makki to obtain and produce counterfeit tax stamps. Members of the Dearborn Network also took 'fraud field trips' in Michigan, New York and North Carolina where they used counterfeit credit cards to defraud merchants, often purchasing cigarettes for resale. The money raised through the Dearborn scheme was laundered by purchasing more cigarettes to feed into the scheme, obtaining fraudulent credit cards, settling debts incurred through the network's activities and purchasing businesses. Finally, Elias Akhdar was accused of burning down his common-law-wife's smoke shop on the Cattaraugus Reserve to claim the insurance on the building.<sup>32</sup>

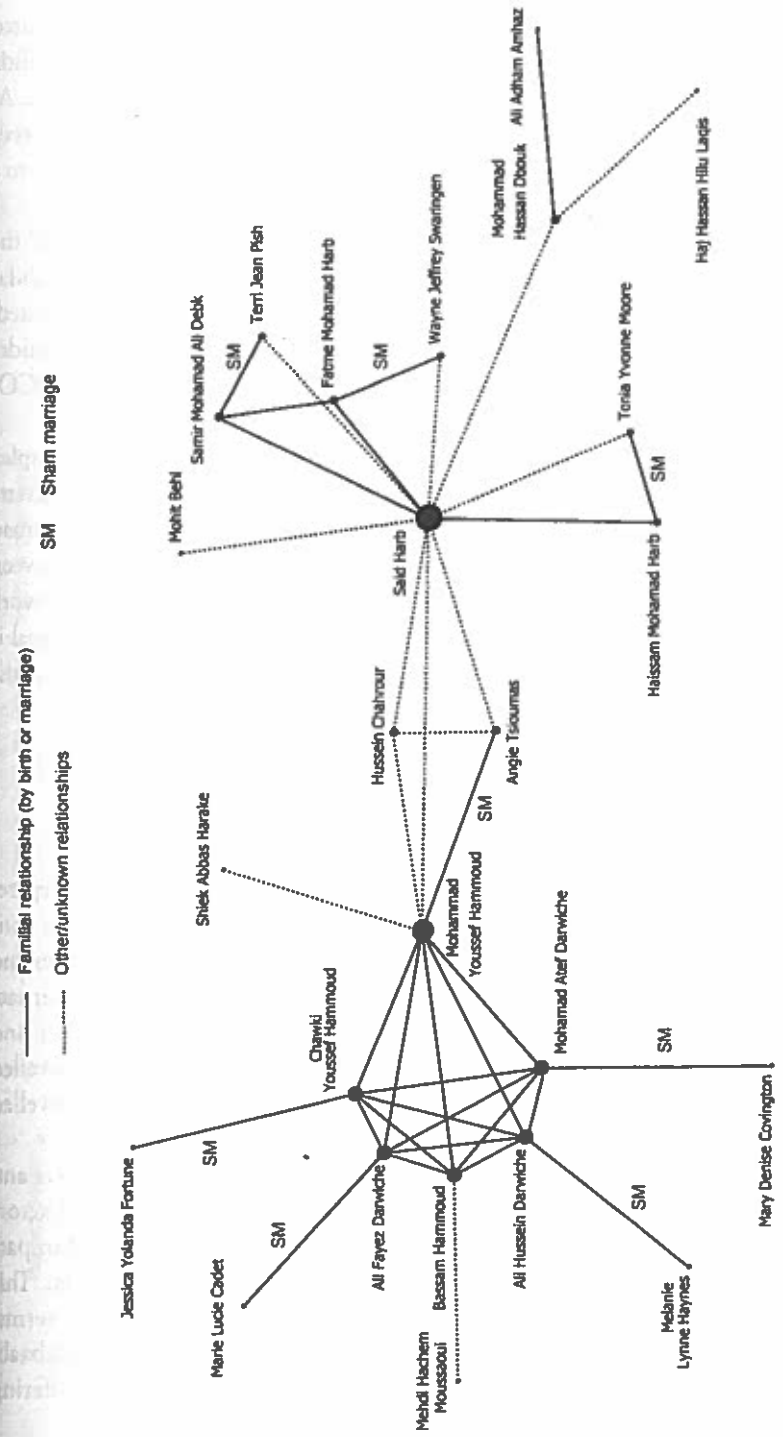


Fig. 39.2 Charlotte Network (Operation Smokescreen). Source: Leuprecht and others (n 4). Note: The size of the nodes is proportional to their 'betweenness centrality', i.e. their propensity to linkage to a broker's ties across the network

As was the case with Mohammad Hammoud, before arriving in the United States, Elias Akhdar had received military training with Amal, a Shiite militia group, and had been involved in armed incursions linked to Hezbollah. As part of the Charlotte Network, Akhdar contributed a portion of the proceeds of criminal activity to Hezbollah;<sup>33</sup> so, the motives were material support to a listed terrorist organization and personal benefit from proceeds of crime.

The Dearborn Network fell apart in 2003 when, upon learning of the indictment of Mohammad Hammoud and his co-conspirators, Elias Akhdar attempted to go into hiding on the Cattaraugus Reserve. He was arrested, however, and, along with ten other members of the network, charged under the Racketeering Influenced and Corrupt Organizations Act 1970 (RICO) and other related offences.<sup>34</sup>

Shown in Fig. 39.3, the Dearborn Network was smaller and less complex than the Charlotte Network. The activities of the network, primarily cigarette smuggling and credit card fraud, were mostly centred on Elias Mohamad Akhdar and his family. Of note, however, is the integral connection between Akhdar and his common-law-wife's family. These key links gave the network access to untaxed cigarettes from the Cattaraugus reserve. Equally integral is the connection between Akhdar and Angie Tsioumas, which connected the Dearborn and Charlotte networks.

### Analysing Terrorist Financing Networks

The MFN includes a pair or pairs of interacting nodes exhibiting high degrees of both betweenness and degree centrality. The link between these pairs constitutes the crux of the fundraising operations between the United States and Somalia; without these links, the funds would have to find an alternate sender or receiver: they comprise the main conduit of information and resources for this network.<sup>35</sup> Information (e.g. account numbers) travelled exclusively in one direction (from Somalia to America), while funds travelled exclusively in the other.

The MFN represents a nuanced form of hierarchy between the centre and the periphery, where the ideological authority of the centre compelled actors in the West to mobilize on behalf of the centre, which in turn relied in part on funds raised by the periphery to achieve objectives in Somalia. This interdependence hinges on ideological authority or, in Bakker et al.'s terms, external legitimacy—which a grievance-driven group, such as Al-Shabaab, needs to maintain to convince people to risk legal prosecution by offering financial support.<sup>36</sup>

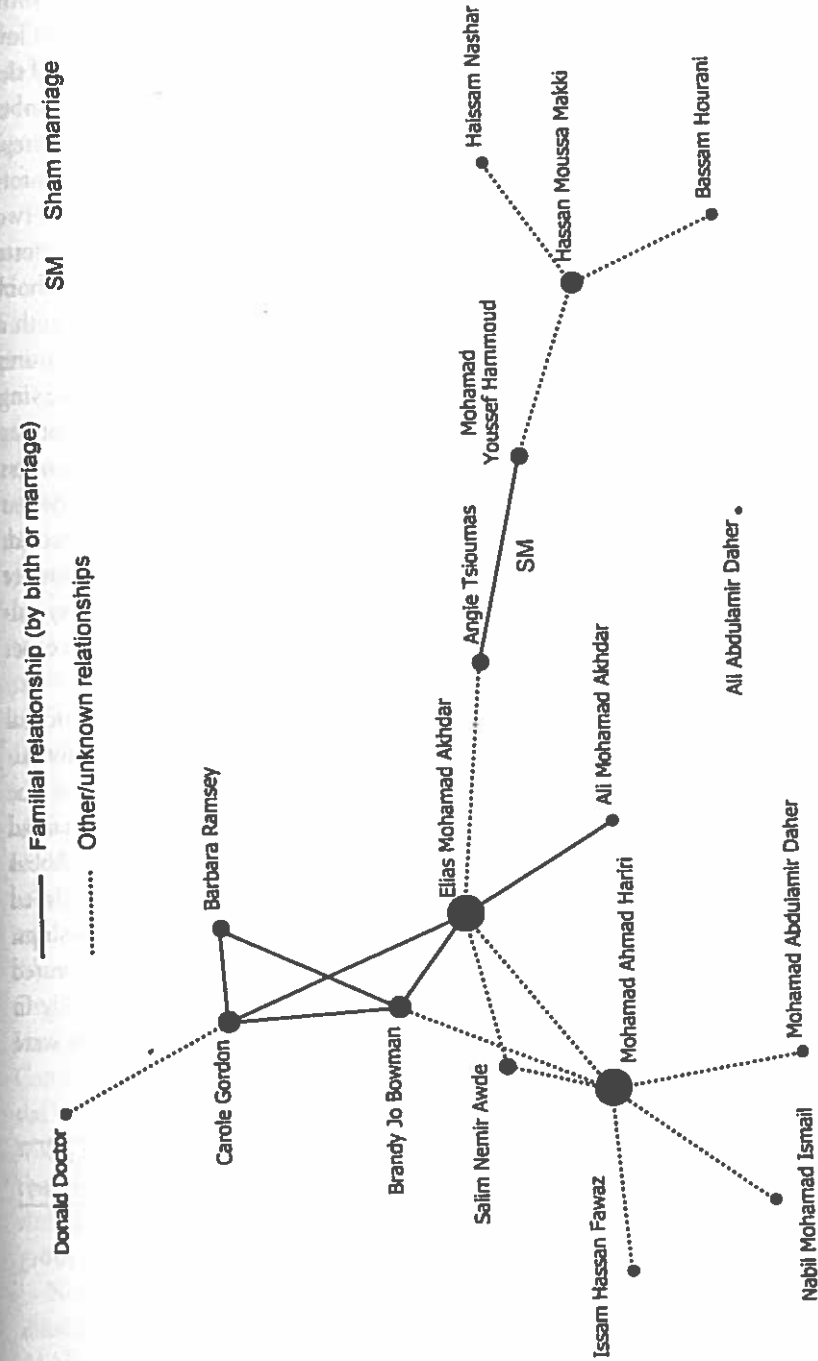


Fig. 39.3 Dearborn Network (Operation Bathwater). Note: The size of the nodes is proportional to the betweenness centrality, that is, their propensity to a broker's ties across the network

For the Hezbollah cases, the key metrics presented in Table 39.1 confirm that the two networks were similar in structure. First, they have a very low density of less than 0.15, which means that less than 15% of the potential ties are actually present. Actors in both networks also have a small average number of ties (1.58 and 1.12) and can be reached through a limited number of steps (2.64 and 3.03). These characteristics are typical of networks in which information and resources can theoretically spread rapidly. Organized around two major hubs—Said Harb and Mohammad Youssef Hammoud—the Charlotte Network has a much higher clustering coefficient (0.43) than the Dearborn Network (0.09), which approximates a random network, a structure with a low degree of clustering and short paths. The different centralization measures in Table 39.1 indicate whether certain actors are exceptionally central. Varying from 0 (none of the actors are exceptionally central) to 1 (the centrality of one actor exceed all nodes), the measures are particularly high for betweenness centrality and eigenvector centrality, a global measure of degree centrality that takes into account the centrality of those with whom actors are connected. High values of betweenness centrality (0.55 and 0.48) confirm the existence of important brokers in both networks, while high eigenvector centrality values (0.45 and 0.49) confirm that actors with many ties are connected to other actors that are well connected themselves.

In both of the networks mapped above, social capital in the form of familial ties was the most important determinant of membership. Of the 26 individuals identified with the Charlotte Network, 11 were connected to at least one other individual through familial ties of birth or marriage. Though Mohamad Hammoud was initially dispatched to the United States by Sheik Abbas Harake, a more senior commander within Hezbollah, once he had established himself, his network grew mostly through pre-existing relationships. Hammoud did not have to recruit individuals upon arrival in the United States because the core of his fundraising network was effectively already in place. Individuals in the Charlotte network with previous kinship ties were

Table 39.1 Key metrics

Measure	Charlotte Network (Operation Smokescreen)	Dearborn Network (Operation Bathwater)
Density	0.13	0.14
Average number of ties	1.58	1.12
Characteristic path length	2.64	3.03
Clustering coefficient	0.43	0.09
Degree centralization	0.34	0.27
Betweenness centralization	0.55	0.48
Eigenvector centralization	0.45	0.49

also the most heavily involved in the smuggling of cigarettes, and they form the densest cluster of the network. In the Dearborn Network run out of Michigan and New York, of the 17 individuals identified, 5 are connected to at least one other node through familial ties. Indeed, it was only Elias Akhdar's family connection through marriage with the Seneca tribe on the Cattaraugus Reservation that allowed him to access a steady supply of untaxed cigarettes.

These networks grew through an organic process based on these pre-existing kinship ties rather than formal recruiting. There is no evidence that Hezbollah dictated either the membership within the networks in the United States or their command and control structure. Rather, 'the criminal enterprise was bound together by physical locality, common heritage, blood and marriage relations, a common language (Arabic) and a common purpose of generating large sums of cash illegally.'<sup>37</sup> Connections based on deep past relationships are deemed 'strong ties.' Strong ties are a hallmark of covert networks. Ties kept within a group bound by a common history and kinship minimize the need for newer 'weak ties,' which mitigates risk by limited exposure of the network. Strong ties were essential to the success of the 9/11 terror networks: 'This dense under-layer of prior trusted relationships made the hijacker network both stealth and resilient.'<sup>38</sup> The insurgency coordinated by Saddam Hussein in Iraq following Operation Iraqi Freedom in 2003 was structured in a similar way: among the 23 actors with direct ties to the former Iraqi dictator, 17 immediate family relationships proved critical to the structure of the network.<sup>39</sup>

The pattern by which individuals were brought into the Charlotte and Dearborn networks reinforces the salience of ethnic ties, whose importance to collective action is well established.<sup>40</sup> As Morselli et al. observed, 'Trust reduces the uncertainty regarding the behavior of potential accomplices to a tolerable level and thereby stimulates the willingness to co-offend.'<sup>41</sup> Organizations based on a common ethnic and religious heritage, such as Hezbollah, rely largely on homophilous links, that is, family and ethnic kin. Candidates for the network are drawn from a 'rather closed circle of potential participants,' which makes the activities of the network easier to hide while raising the cost of defection.<sup>42</sup> This distinguishes the Al-Shabaab from the Hezbollah case studies: in the latter, homophilous ties are more likely the result of ethnicity than ideology, and thus not directly related to the group's function.

Not only is the mechanism by which the two networks were able to grow illustrative, but so is the structure of the networks themselves. Similar to the Al-Shabaab networks, both the Charlotte and Dearborn networks raised funds using a hub-type network. In the Charlotte network, Table 39.2 confirms that



Table 39.2 Immediate impact of removal of selected nodes

	Charlotte Network		
	Said Harb	Mohammad Y. Hammoud	Angie Tsioumas
	% change	% change	% change
Diffusion	-63	-54	-1
Clustering coefficient	-47	-3	-5
Fragmentation	762	667	4
	Dearborn Network		
	Elias M. Akhdar	Mohamad A. Hariri	Angie Tsioumas
	% change	% change	% change
Diffusion	-54	-38	-39
Clustering coefficient	-44	-30	10
Fragmentation	424	283	318

both Said Harb and Mohammad Youssef Hammoud had high degree and betweenness centrality measures; they look like the subgroup leaders that they actually were, rather than the 'ideal broker' characteristics of low degree but high betweenness centrality measures. Five other actors of the network can be described as 'well-informed members' as they have relatively high degree centrality scores but low betweenness centrality. The rest of the network is composed of 'foot soldiers' in charge of select activities related to smuggling, sham spouses and second-tier lieutenants. In the Dearborn Network, Elias Mohamad Akhdar and Mohamed Ahmad Hariri play the role of subgroup leaders, with high degree and betweenness centrality scores, while Angie Tsioumas and Mohamad Youssef Hammoud can be seen as brokers in the contraband cigarette provision. The rest of the actors exhibit low centrality scores.

By comparing three measures—Diffusion, Clustering Coefficient and Fragmentation<sup>43</sup>—before and after the removal of certain actors, SNA also allows to identify which actor's disappearance leads to significant disruption to the structure of the two Hezbollah networks.

The *Diffusion* measure is based on the distance between actors and indicates whether the network can easily spread information and resources. Small values indicate that the actors are farther apart, and large values mean that they are close to one another. With the exception of Angie Tsioumas, the hypothetical removal of all the actors listed in Table 39.2 negatively affects diffusion throughout both Hezbollah networks, as actors tend to be farther apart and less able to communicate.

The *Clustering Coefficient* measures the extent to which actors tend to form clusters and indicates how information spreads through groups of actors. Small clustering coefficients support global information diffusion and a centralized structure, while high clustering coefficients are a sign of tightly knit

groups. In the Charlotte network, the removal of Said Harb would particularly affect how network members share information among themselves (-47%) due to the fact that, as a subgroup leader, Said Harb is widely connected to the group. The effect is also particularly pronounced for Elias M. Akhdar (-44%) and Mohamad A. Hariri (-30%) in the Dearborn Network.

Finally, the *Fragmentation* measure indicates the proportion of actors who are disconnected. As expected, Said Harb is the actor of the Charlotte Network whose hypothetical disappearance would most fragment the structure. Table 39.2 confirms that, without him, the network would be much more fragmented (+762%). Similar values are found for Mohamad Youssef Hammoud (+667%). By contrast, the hypothetical removal of Angie Tsioumas would lead to significantly less disruption (4%), which can be explained by the fact that her structural position is made redundant by a direct connection between Hammoud and Harb and by another link that passes through Hussein Chahrour. The redundancy of ties is a normal feature of dark or criminal networks, which ensure the network's operational resilience in case it is partially destroyed. In the Dearborn Network, the disappearance of Elias Mohamad Akhdar, the subgroup leader, would strongly increase the proportion of actors that would be disconnected and, generally speaking, have a disruptive impact on the network (+424%). The disappearance of Angie Tsioumas (+318%) and of the other subgroup leader, Mohamad Ahmad Hariri (+283%), would prove equally disruptive.

## Conclusion

This study was confined to sample networks in the United States, which is partially a function of it being the jurisdiction that prosecutes such cases most aggressively and of the common law system where, unlike civil law jurisdictions, the bulk of the evidence in a court case becomes public as a result of disclosure. However, comparing different networks in the same jurisdiction has the benefit of effectively controlling for similarities and differences in ways that would otherwise be more difficult methodologically if context and conditions were held less constant. The initial hypotheses need further empirical scrutiny and validation, both through comparison to other illicit networks and through comparison to other terror networks about which reliable information is available, so that brokers can be identified where they exist, linkages confirmed, and an accurate model of the entire network and its relations to a central organization can be constructed. The fact that the great

majority of the nodes in the Al-Shabaab networks are Somalis living in a Western-based diaspora raises the importance of diasporas and ethnic capital as means of decreasing marginal and transaction costs as an issue that also warrants further study. Ethnic identity compounded by radical Islamist/jihadist ideology certainly had a hand in congealing these networks.

Information about the function of a network, even when many of its nodes and linkages remain obscure, can be indicative of its structure and, therefore, how best to intercept it. For example, knowledge that the network is oriented towards raising and remitting funds would warrant the search for a 'broker' node whose disruption would debilitate the function of the network, at least temporarily. As Bakker *et al.* confirm, much work remains to be done on how networks replace nodes, re-establish links or re-route flows of information and/or resources through other nodes; so, it is difficult to predict how effective the removal of nodes would be over time.<sup>44</sup> However, the possibility that a network's function and structure are related is a promising step towards a more nuanced strategy to contain and deter such networks: not all terror networks are alike. This is a significant empirical finding for counter-terrorism. Knowing the function of a network makes it possible to counter it by detecting and debilitating its nodes. Conversely, knowing the structure of a network makes it possible to surmise its purpose.

Once leaders are removed, hub-type networks break down into isolated units or individuals unable to communicate effectively in the pursuit of their ends. That is exactly what happened in the case of the Charlotte Network. Investigators targeted Said Harb, the pivotal subgroup leader. They were able to 'turn' him to provide evidence against the other members of the network. Since Harb was so well connected, and provided the only link between individuals in Charlotte and Canada, the intelligence he provided was sufficient to shut down the entire network, in a way that random targeting of other individuals would not. For example, many of the drivers who smuggled contraband across state lines had been stopped and their cargoes confiscated, but such random arrests did little to shed light on the true extent and purpose of the scheme. One of the members of the Dearborn Network, Hassan Moussa Makki, who was sentenced in 2003 for providing material support to Hezbollah, had been arrested in 1996 with nearly 2400 cartons of contraband cigarettes in his truck.<sup>45</sup> Nonetheless, being arrested did not appear to be much of a deterrent, and Makki would continue to smuggle cigarettes for years to come. A 2008 study of tobacco smuggling and terrorism in Michigan concluded: 'This is probably not the only instance of smugglers making their way into and back out of the hands of law enforcement officials only to return to their previous line of work.'<sup>46</sup>

A second important conclusion to be drawn from this study relates to the impact of disruption strategies on hub networks. Criminal intelligence in the types of cases in this chapter is collected using human and electronic surveillance as well as informants. Yet, Table 39.3 summarizes the extent to which the ready ability of police to overcome digital roadblocks such as encryption, interception and storage of data varies across select allied democracies.

Moreover, criminal investigations are increasingly hamstrung without the ability to compel suspects to reveal passwords and encryption keys for locked cell phones and computer data, warrantless access to user data that Internet service providers (ISPs) hold, having telecommunications and ISPs retain user data such as email, text messages and call records, and requiring telecommunications and ISPs to build intercept capabilities into their networks.

Table 39.3 Investigative capacity in a digital world across the Five Eyes community of states

	Australia	Canada	New Zealand	United Kingdom	United States
Legal remedies for encryption				Active dialogue/in progress	Active dialogue/in progress
Extra-territorial research legislation to assist in accessing data stored abroad	Active dialogue/in progress		In place	In place	Active dialogue/in progress
'Communication service' is broadly defined (not infrastructure specific)	In place		In place	In place	Active dialogue/in progress
Retention of communications data required by law	In place			Active dialogue/in progress	
Intercept capable services are required by law (full or partial coverage)	In place		In place	In place	In place
Administrative regime for access to subscriber information	In place		In place	In place	In place

Sources: Royal Canadian Mounted Police, "Digital Policing Challenges and the Way Ahead: Briefing to the National Security Advisor to the Prime Minister" (2016) <[www.documentcloud.org/documents/3220472-RCMP-Digital-Policing-Challenges-and-the-Way.html](http://www.documentcloud.org/documents/3220472-RCMP-Digital-Policing-Challenges-and-the-Way.html)> accessed 21 March 2017; William Mosseri-Marlio and Charlotte Pickles, "The Future of Public Services: Digital Policing" (2016) <[www.reform.uk/wp-content/uploads/2016/04/Digital-Policing-WEB.pdf](http://www.reform.uk/wp-content/uploads/2016/04/Digital-Policing-WEB.pdf)> accessed 21 March 2017

Obtaining cross-border evidence through Mutual Legal Assistance Treaties in a timely fashion also remains a hindrance, as does the general inability to monetize the broader social cost of such crimes and thus demonstrate the payoff of law enforcement activity. Finally, prevailing gaps in capacity to manipulate large amounts of data and the systematic application of network science as manifest in this chapter rather than simply relying on descriptive link diagrams means that enforcement is (far) less effective and efficient than it could (and should) be. Ultimately, the chapter makes the case for paradigm shift from a node-centric to a network-centric approach to apprehending terrorist financing.

Knowing that fundraising networks conform to the structure identified in this chapter enhances domain awareness for policy makers and law enforcement and equips them with tactics to contain, deter the proliferation of such illicit activities. Fundraising networks are vulnerable at the hub, but resilient against traditional counter-terror measures that target hierarchies. They tend to compensate for the relative vulnerability of their structure by relying on strong ties with pre-existing acquaintances but, as the dismantling of the Charlotte and Dearborn networks shows, a strategy of targeting the best connected actors in terms of both degree and betweenness centrality has been shown successful as a means of bringing the network to light and disrupting its activities.

A third conclusion is a more general observation on the nature of terror networks. Instead of operating as hierarchical organizations, with orders flowing from a figure at the head down through the network, this article reinforces the view that terror networks should be conceived for what they are and how they work, and not solely according to their formal structure. As Stohl and Stohl concluded in their own study of terror networks, it is difficult to conceive networks as clear command structures closely modelled on the military model: 'Rather, a terrorist network is at the nexus of multiple groups and constituencies that are linked in significant but non-hierarchical ways and can only be understood in context.'<sup>47</sup> This is a particularly important observation to be drawn from a case study of Hezbollah, an organization that is commonly taken to be rigid and hierarchical. However, this assumption does not hold for Hezbollah's globalized criminal activities. While the main structure of Hezbollah, that is to say the political party and semi-governmental organization in Lebanon, may follow a more hierarchical organizational structure, illicit networks supported by Hezbollah in North America are able to maintain their secretive and stealthy nature precisely by adopting a more informal and flexible structure.

## Notes

1. Celina B Realuyo, 'Finding the Islamic State's Weak Spot' (2015) 28 *The Journal of International Security Affairs* 73; Chris Dishman, 'Terrorism, Crime, and Transformation' (2005) 24(1) *Studies in Conflict and Terrorism* 43.
2. The White House, 'Strategy to Combat Transnational Organized Crime: Addressing Converging Threats to National Security' (2011), Cover letter <[https://obamawhitehouse.archives.gov/sites/default/files/Strategy\\_to\\_Combat\\_Transnational\\_Organized\\_Crime\\_July\\_2011.pdf](https://obamawhitehouse.archives.gov/sites/default/files/Strategy_to_Combat_Transnational_Organized_Crime_July_2011.pdf)> accessed 21 March 2017.
3. Australian Crime Commission, Media Release, 'Task Force Eligo Generates More Than \$580 Million in Cash, Drugs, and Assets' (23 January 2014) <[www.austrac.gov.au/media/media-releases/task-force-eligo-generates-more-580-million-cash-drugs-and-assets](http://www.austrac.gov.au/media/media-releases/task-force-eligo-generates-more-580-million-cash-drugs-and-assets)> accessed 21 March 2017.
4. This chapter synthesizes evidence that previously appeared in Christian Leuprecht and others, 'Hezbollah's Global Tentacles: A Relational Approach to Convergence with Transnational Organised Crime' *Terrorism and Political Violence* (2017) 29(5) 902. Christian Leuprecht and Kenneth Hall, 'Why Terror Networks are Dissimilar: How Structure Relates to Function' in Anthony J Masys (ed), *Networks and Network Analysis for Defence and Security* (Springer 2014); Christian Leuprecht and Kenneth Hall, 'Networks as Strategic Repertoires: Functional Differentiation Among Al-Shabaab Terror Cells' (2013) 14(2-3) *Global Crime* 287.
5. Michael Freeman, *Financing Terrorism: Case Studies* (Ashgate Publishing 2012).
6. Walter W Powell, 'Neither Market nor Hierarchy: Network forms of Organization' (1990) 12 *Research in Organizational Behaviour* 295.
7. For example, see Marc Sageman, *Understanding Terror Networks* (University of Pennsylvania Press 2004); Sean Everton, *Disrupting Dark Networks* (CUP 2013); Renée van der Hulst, 'Terrorist Networks: The Threat of Connectivity' in John Scott and Peter J Carrington (eds), *The SAGE Handbook of Social Network Analysis* (SAGE 2011).
8. Olivier Walther and Dimitris Christopoulos, 'Islamic Terrorism and the Malian Rebellion' (2014) 27(3) *Terrorism and Political Violence* 497; Ian A McCulloh, Kathleen M Carley, and Matthew Webb, 'Social Network Monitoring of Al-Qaeda' (2007) 1(1) *Network Science* 25; Aric Perliger and Ami Pedahzur, 'Social Network Analysis in the Study of Terrorism and Political Violence' (2011) 44(1) *PS: Political Science & Politics* 45.
9. Ronald S Burt, 'The Network Structure of Social Capital' (2000) 22(1) *Research in Organizational Behavior* 345; Ronald S Burt, *Structural Holes: The Social Structure of Competition* (Harvard University Press 1992); Ronald S Burt, 'Structural Holes and Good Ideas' (2004) 100(2) *American Journal of Sociology* 349.
10. Carlo Morselli, 'Assessing Vulnerable and Strategic Positions in a Criminal Network' (2010) 26(4) *Journal of Contemporary Criminal Justice* 382; Cale

- Horne and John Horgan, 'Methodological Triangulation in the Analysis of Terrorist Networks' (2012) 35(2) *Studies In Conflict & Terrorism* 182.
11. Morselli (n 10).
  12. Carlo Morselli and Julie Roy, 'Brokerage Qualifications in Ringing Operations' (2008) 46(1) *Criminology* 71; Emma S Spiro, Ryan M Acton, and Carter T Butts, 'Extended Structures of Mediation: Re-Examining Brokerage in Dynamic Networks' (2013) 35(1) *Social Networks* 130.
  13. Morselli (n 10).
  14. Burt 'The Network Structure' (n 9).
  15. Morselli (n 10).
  16. Mette Eilstrup-Sangiovanni and Calvert Jones, 'Assessing the Dangers of Illicit Networks: Why Al-Qaida May Be Less Dangerous Than Many Think' (2008) 33(2) *International Security* 12.
  17. *US v Mohamad Abdi Yusuf, Duane Mohamed Diriye and Abdi Mahdi Hussein* [2010] Indictment (USDC, Eastern District of Missouri, Eastern Division).
  18. *Ibid.*
  19. *Ibid.*
  20. Of this network, only Ali and the book-keeper (Hawo Mohamed Hassan) were indicted on charges by the US government. Information about unindicted co-conspirators was crucial to justifying these indictments and is important here in accurately portraying the nature of this network's activities and the structure of the network necessary for these activities. *US v Amina Farah Ali and Hawo Mohamed Hassan* (2010) Indictment (USDC, District of Minnesota).
  21. See Leuprecht and others (n 4) 6.
  22. Mathew Levitt, *Hezbollah: The Global Footprint of Lebanon's Party of God* (Hurst & Co 2013).
  23. Tom Diaz and Barbara Newman, *Lightning out of Lebanon: Hezbollah Terrorists on American Soil* (Ballantine Books 2005) 88.
  24. Republican Staff of the U.S. House Committee on Homeland Security, 'Tobacco And Terror: How Cigarette Smuggling Is Funding Our Enemies Abroad Prepared By The Republican Staff Of The U.S. House Committee On Homeland Security U.S. Rep. Peter T. King (R-NY), Ranking Member' <[www.foxnews.com/projects/pdf/Cigarette\\_smuggling\\_042408.pdf](http://www.foxnews.com/projects/pdf/Cigarette_smuggling_042408.pdf)> accessed 21 March 2017.
  25. Levitt (n 22).
  26. Diaz and Newman (n 23).
  27. *Ibid.*
  28. Levitt (n 22).
  29. *US v Elias Mohamad Akhdar et al* [2003] 2 Government's Written Proffer in Support of its Request for Detention Pending Trial (USDC, Eastern District of Michigan Southern Division).

30. Republican Staff of the U.S. House Committee on Homeland Security (n 24).
31. *US v Elias Mohamad Akhdar et al* [2004] Indictment (USDC, Eastern District Of Michigan Southern Division) 4–5.
32. *Ibid.* 5–8.
33. *Elias Mohamad Akhdar* (n 29).
34. Levitt (n 22) 321.
35. Given, as is the case, that the receiving node controls the information (i.e. the account numbers that correspond to his subordinates) that allows the sending broker to successfully transfer funds to these nodes.
36. Rene M Bakker, Jorg Raab, and H Brinton Milward, 'A Preliminary Theory of Dark Network Resilience' (2012) 31(1) *Journal of Policy Analysis and Management* 33.
37. *Elias Mohamad Akhdar* (n 29).
38. Vladis E Krebs, 'Mapping Networks of Terrorist Cells' (2002) 24(3) *Connections* 43.
39. Brian Joseph Reed, *Formalizing the Informal: A Network Analysis of an Insurgency* (2006) unpublished Ph.D. thesis, University of Maryland.
40. James Habyarimana and others, *Coethnicity: Diversity and the Dilemmas of Collective Action* (Russell Sage Foundation 2009).
41. Carlo Morselli, Thomas Gabor, and John Kiedrowski, 'The Factors That Shape Criminal Networks' (2010) Organized Crime Research Brief No 7, 26 <[http://publications.gc.ca/collections/collection\\_2012/sp-ps/PS4-89-2010-eng.pdf](http://publications.gc.ca/collections/collection_2012/sp-ps/PS4-89-2010-eng.pdf)> accessed 21 March 2017.
42. Cynthia Stohl and Michael Stohl, 'Networks of Terror: Theoretical Assumptions and Pragmatic Consequences' (2007) 17(2) *Communication Theory* 115.
43. Kathleen M Carley and others, *ORA User's Guide 2013* (2013) Carnegie Mellon Center of the Computational Analysis of Social and Organization Systems, Technical Report 13-108 <[www.casos.cs.cmu.edu/projects/ora/CMU-ISR-13-108.pdf](http://www.casos.cs.cmu.edu/projects/ora/CMU-ISR-13-108.pdf)> accessed 21 March 2017.
44. Bakker, Raab, and Brinton Milward (n 36). See also Paul A Duijn, Victor Kashirin, and Peter Sloot, 'The Relative Ineffectiveness of Criminal Network Disruption' (2014) 4 *Nature Scientific Reports* 4238.
45. Michael LaFaive, Patrick Fleenor, and Todd Nesbit, 'Michigan From 1990 to the Present' (2008) Mackinac Centre for Public Policy Study <[www.mackinac.org/10041](http://www.mackinac.org/10041)> accessed 21 March 2017.
46. Michael LaFaive, Patrick Fleenor, and Todd Nesbitt, 'Cigarette Taxes and Smuggling: A Statistical Analysis and Historical Review' (2008) Mackinac Center for Public Policy, 40 <[www.schoolchoiceworks.org/archives/2008/s2008-12.pdf](http://www.schoolchoiceworks.org/archives/2008/s2008-12.pdf)> accessed 21 March 2017.
47. Stohl and Stohl (n 42) 107.

**Christian Leuprecht** is a professor at the Royal Military College of Canada (RMCC), Matthew Flinders Fellow in the Centre for Crime Policy and Research at Flinders University of South Australia, cross-appointed to Queen's University, and the Munk Senior Fellow in Security and Defence at the Macdonald Laurier Institute. He is a member of the College of New Scholars of the Royal Society of Canada and a recipient of RMCC's Research Excellence Award. He holds a Governor-in-Council appointment to the governing Council of the Natural Sciences and Engineering Research Council of Canada, is president of the International Sociological Association's Research Committee 01: Armed Forces and Conflict Resolution, a UN Security Structure Expert, and is regularly called as an expert witness to testify before committees of Parliament.

**Olivier Walther** is an associate professor of Political Science at the University of Southern Denmark and a visiting associate professor at the Center for African Studies at the University of Florida. He holds a PhD in Geography from the University of Lausanne. His research has pioneered the introduction of social network analysis to the study of trade, cross-border cooperation and terrorism in West Africa. Walther has received support for his work from the United Nations, the European Commission, the OECD, the European Spatial Planning Observatory, the governments of Luxembourg and Denmark, and the Carlsberg Foundation. Walther is the Africa Editor of the *Journal of Borderlands Studies* and is on the executive committee of the African Borderlands Research Network.