THE CHANGING NATURE OF SUICIDE ATTACKS –

A SOCIAL NETWORK PERSPECTIVE

Ami Pedahzur
Department of Government
The University of Texas at Austin
Burdine 536
1 University Station A1800
Austin TX 78712-0119
Tel: 512-232-1452
ap2976@mail.la.utexas.edu

Arie Perliger
Department of Political Science
University of Haifa
Mount Carmel, 31905
Haifa, Israel
Tel: 972-54-7654312
aperliger@poli.haifa.ac.il
Abstract

In order to comprehend the developments underlying the suicide attacks of recent years, and especially with regard to both Al-Qaeda and the Palestinian groups, we suggest that the organizational approach, which until recently was used to explain this phenomenon, should be complemented with a social network perspective. By employing a social network analysis of Palestinian suicide networks, we have found that, in contrast to prevailing perceptions which view suicide attacks as a product of strategic decisions made within organizational frameworks, decisions were actually made, to a great extent, by local activists, and struggles between local and family groups proved to be the best predictor of their actions in this context. We also found that networks of suicide bombers do not develop arbitrarily or without a guiding hand, but rather that, over the course of time, the “hubs” of these networks proved to be the main agents in getting various “actors” to join the network. Another important finding was that the peripheral nature of suicide bombers was a characteristic common to most networks. This supports the assumptions of the majority of researchers in this field, i.e., the suicide bomber is a weapon in the service of an elite which prefers to dispatch individuals on these missions who are of minor importance and contribute little to the essential, ongoing operation of the network. Finally, we have found that the existence of cohesive subgroups as well as the number of hubs in a network have an influence on the network’s effectiveness. We conclude the paper by showing that the method of network analysis can also be of considerable assistance from the standpoint of coping with suicide attacks. On the one hand, this is possible by identifying the network’s central figures who are essential for its continued existence, and on the other, by predicting who are the actors with the greatest potential in becoming suicide bombers according to their location in the network.
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Introduction

In recent years, there has been a breakthrough in the study of the phenomenon of suicide attacks. Robert Pape’s\(^1\) work, in which he analyzed how suicide bombers were used as a means to force certain powers in the international arena to alter their policy in asymmetrical territorial disputes, paved the way for employing rational assumptions and an organizational perspective in explaining this phenomenon.\(^2\) Bloom’s\(^3\) study constitutes a good example of this perspective; she showed how the logic of organizational competition for public support is a factor that explains the increase or decrease in the use of suicide bombers. Recently, a number of studies based on these works have been published, all focusing on an analysis of the interactions among the individual, the community, and the organization.\(^4\) Despite the wide range of factors used in these analyses, it appears that all the researchers in this line of thought view organizations and their elites as central figures in the initiation of suicide attacks.

Most of these studies substantiate their claims on the basis of case studies of organizations such as Hezbollah, the LTTE, the PKK, and the various Palestinian organizations. The key to this impressive theoretical advancement lies in the fact that all these organizations featured an orderly hierarchical structure that operated according to the directives of a leader or an identified echelon of leaders. Additionally, these
organizations have all proclaimed the liberation of territory or struggle for the rights of a certain ethnic minority as their raison d’être.

The paradox which is the current article’s point of reference is that the majority of these organizations, apart from the Palestinian ones, almost completely desisted from employing suicide bombers at the end of the last decade. Nevertheless, suicide attacks have not become a thing of the past. In fact, quite the opposite.

Figure 1 around here

The number of suicide attacks in the last 5 years is 2.7 times greater in comparison to the period beginning in the 1980s and lasting until 1999; and the use of human bombs only increases (see Figure 1). Even so, while the number of suicide attacks perpetrated by established organizations with hierarchical structures is on the decline, the numbers of attacks carried out by groups lacking an easily identifiable structure or established leadership is on the rise (see Figure 2).

Figure 2 around here

The most prominent name in suicide attacks in recent years has been Al-Qaeda. The very name of the group (“the base,” in Arabic) is already an indication of the manner in which this group is unlike the organizations mentioned above. The majority of studies investigating Al-Qaeda in recent years, and particularly following the events of September 11th and the American invasion of Afghanistan, stress the fact that this is not a group with a clear-cut leadership or systematic structure but one that executes attacks by employing a network of cells dispersed worldwide or by cooperating with local groups. The researcher to express this in the most coherent fashion was Marc Sageman, who
abandoned the organizational orientation in his research of the global jihad, preferring, instead, a network analysis approach.\textsuperscript{7}

However, the dissimilarity is not only in Al-Qaeda’s structure. The goals in the name of which the network operates are not as distinct as the goals of those organizations that employed suicide attacks during the course of the 1980s and 1990s. The attempt to assert that the exclusive aims of Al-Qaeda and its various derivatives throughout the world are simply territorial is somewhat forced.\textsuperscript{8} It seems that each one of the cells connected in one way or another to Al-Qaeda have different aims, and that the central figures in each such cell are not subject to the directives of a central leadership.\textsuperscript{9}

However, it is not only difficult to analyze acts attributed to Al-Qaeda according to earlier theoretical models. During the course of the Al-Aqsa uprising, those Palestinian groups that until the turn of the century neatly fit contemporary theories and even served as central case studies for the most prominent researchers of suicide attacks,\textsuperscript{10} in fact divested themselves of their orderly organizational structure to the extent that the Palestinian suicide attackers network today resembles Al-Qaeda more than organizations such as Hezbollah, LTTE, or PKK. This is especially true in one major aspect. While, unlike Al-Qaeda, Palestinian groups do not operate internationally, their perpetration of suicide attacks is also a product of local independent networks and not a result of an hierarchical organizational process as in the cases of the abovementioned established organizations. As demonstrated in the words of a veteran IDF general, “The terrorist networks in the cities and villages operate almost independently; we are not facing Hamas or Fatah but a Balata terrorist group and a Dheisheh terrorist group” (Balata and Dheisheh are both names of refugee camps).\textsuperscript{11}
What is the explanation for this development? The reoccupation of Palestinian territory by Israel has caused most of the operational sector and lower backbone of Palestinian groups to split up into cells on a regional basis. Particularly in regard to the Hamas, the policy of targeted assassinations has forced the leadership to go underground and almost completely vanish. Moreover, and mainly as a result of the need to concentrate on their survival, the ability of groups leaders to continue their involvement in the operational aspects of the groups’ activity has gradually declined. This is not to say that Palestinian groups have stopped existing; in many ways they are still strong actors in the Palestinian political arena; however, in the context of the implementation of suicide attacks, there importance has declined in comparison to the growing role of the local networks.

At any rate, this organizational chaos has had a clear and immediate effect on the nature of suicide attacks in the Palestinian arena. First, many suicide attacks were planned and executed by independent local operatives and featured little, if any, involvement of the senior ranks in the groups. Second, the timing of many attacks has often contradicted the groups’ interests. Third, suicide bombers themselves were not members of groups and did not undergo a period of organizational training and indoctrination.

If so, does this signify competition among groups? This appears not to be the case. Some of the suicide attacker cells themselves were comprised of youths who belonged to different groups, so that if one speaks of any type of association among the groups, it is more a matter of cooperation than competition.

**Suicide Attacks – Network Approach**

In order to comprehend the development of suicide attacks of recent years, and especially with regard to both Al-Qaeda and the Palestinian groups, we suggest that the
organizational approach be supplemented with a social network perspective. More specifically, we suggest shifting our level of analysis from the organization to the networks operating within or independent of the group. However, it should first be mentioned that the use of the network operational structure is not new in the realm of terrorist groups. Examples can already be found during the late 1970s and in the early 1980s, as left-wing groups over Europe cooperated in the execution of specific attacks or short-time campaigns. Yet, in contrast to Al-Qaeda and the Palestinian groups of our days, these groups kept their hierarchical structure.

Although the results of attacks perpetrated by organizations and networks are similar, a number of significant differences indeed exist between the two structural types. We fully accept the assumption that the goals of the leaders of organizations are a combination of attempts to force changes in policy and to achieve objectives in the internal political arena. However, in the network model, the situation depicted is substantially different. The term, “leader,” should be substituted with “hub,” i.e., the same actor at the center of the map where most connections in the network either lead to or derive from. In contrast to the concept of organizational leadership, which is identifiable, established, and employs a hierarchical structure, the “hub” is invariably a local operative who is not particularly known, may be frequently replaced and occasionally shares his or her influence over the network with other operatives or “hubs.” The network that he or she operates has no organized hierarchical structure, and the operative himself or herself often doesn’t even know its true size nor all of its members. In some cases, “hubs” are local representatives of the group and receive instructions, usually in an indirect manner, from the group leadership. In other cases, while networks are still operating in the general
context of a community struggle for political gains, the “hubs” will use the network and its ability to dispatch suicide bombers by reason of personal or local political interests, primarily as a tool to gain territorial control or political dominance in a specific region by the local group or family he or she belongs to.

The elite structure and the motives behind acts of violence in general and suicide attacks in particular are not the only distinction of the network form. By its very nature, the network structure and its functioning differ from that of the organization. Although there are essentially several forms of the network structure, as showed in Arquilla and Ronfeldt’s conceptualization of the different types of networks, organizations are generally characterized by a systematic hierarchical structure in emulation of army units, while the network form is more elusive. It is less hierarchical and lacks a clear-cut distinction between leadership and operatives. A network can materialize in a single day, go through constant changes, and disappear after a short period of time. The process of joining a network is also different from that of a conventional organization. Organizations initiate recruitment programs, pick out potential candidates, persuade or force them to join ranks and train them for various operations, including suicide missions. Networks, on the other hand, are often established on the basis of primordial ties of friendship and family relations, and joining them is mostly by way of “a friend brings a friend.” The training process, if there is one at all, is generally brief and carried out by the recruiter.

In contrast to organizations which are capable of isolating and training recruits in self-contained paramilitary programs, networks are usually part of the community in which they operate. In certain cases, network members are able to create social enclaves and
may succeed in isolating themselves from the environment,\textsuperscript{22} however, in other instances, they may in fact be influenced by the community disposition and the attitude of the immediate environment towards the idea of self-sacrifice as a part of guerilla warfare or terror.

\textbf{Social Networks Analysis}

The analysis of Palestinian networks should help in examining the majority of the assumptions raised above. In some instances, additional methodological approaches were also used in order to fill out the analysis. In the first stage, we shall try to determine the factors responsible for the initiation and dispatching of young men and women on suicide missions. To this end, we will identify the central actors—the hubs—in each network; we will examine the factors that motivated them to establish the network and deploy suicide attackers. While determining the identity of the hubs by means of network analysis, we will uncover their objectives according to an analysis of their motives as manifested in written documents, interviews and on the basis of when they began to dispatch suicide attackers. In the second stage, we shall address the question of how these networks operate. We will examine how the network was formed, how it recruited members, and its relations with the surrounding community. Next, we will review the features of the networks and we will examine the relationship between their structure and operational capabilities. In this way, we will attempt to examine which types of networks carry a greater potential for dispatching suicide bombers and if certain features of the network are able to predict its success in surviving and being able to sustain a suicide attacks campaign in the long term.
Network analysis can also be of considerable assistance from the standpoint of coping with suicide attacks. On the one hand, we will identify the network’s central actors and the figures who are essential for its continued existence. On the other hand, we will predict who are the actors with the greatest potential in becoming suicide bombers according to their location in the network.

Before conducting an analysis of the networks of Palestinian suicide bombers, we will outline a number of the principles of the method used to analyze the network. Social network analysis, similar to other quantitative methods, is a research tool designed to describe and investigate a variety of social phenomena. However, while quantitative methods usually focus on the description and aggregate analysis of the attributes of those actors who make up the research population, network analysis assumes that in order to comprehend social phenomena, we must map out and analyze the system of ties among the various actors and the ways in which these ties influence their activity.23

In the following presentation of the Palestinian networks, in addition to the “hub” construct, we will also make use of two other principal concepts. The first is “node” which refers to an actor in the network who has the potential for making contacts with other actors. In fact, a hub is a node whose number of ties are much greater than regular nodes. The second concept, “tie,” indicates the situation in which some type of relationship exists between two actors. These ties are of different types and different levels of intensity. The decision regarding how they are to be measured is mostly made according to the researcher’s needs. In this fashion, for instance, a researcher might make a distinction between family ties and ties among acquaintances, or, if studying family networks, the researcher might want to distinguish between close and remote family ties.
At any rate, researchers employing network analysis attempt to improve their understanding of the object of research by analyzing the ties between and among nodes as well as their nature and location in the network.

For the purpose of this study, we have used two types of analysis that are fairly common in the examination of social networks. The first relates to analyses that provide information on the status of each actor in the network and include three indices of centrality—degree centrality, closeness, and betweenness.

The degree centrality is the proportion between the quantity of the actual ties of each actor and the number of his/her potential ties. This measure enables us to examine who among the network actors is directly connected to more members in the network, and if there are hubs within the network, i.e., actors who maintain a number of ties that is significantly greater than that of other members in the network. In the context of this study, we calculated degree centrality using the Freeman approach.24

Measures of degree centrality might be subject to critique because they only account for the immediate ties of an actor in the network rather than his/her indirect ties to all others. One actor might be connected to a large number of others, but those others might be in fact disconnected from the network as a whole. In a case like this, the actor could be quite central, but only in a local neighborhood. Measures of closeness centrality emphasize the distance between an actor and the others in the network by focusing on the distance between each actor and all the others. For example, in Figure 3 (see Appendix), we can see that Muhi a-din Sharif and Abed Issa both have high levels of centrality, however Sharif is clearly more “close” to most of the network members than Issa. In the current study, closeness was measured by using the Freeman geodesic path approach.25
Finally, levels of betweenness help us locate those actors who connect between subgroups or lone actors within the network. Betweenness views an actor as being in a favored position to the extent that he or she falls on the geodesic paths between other pairs of actors in the network. That is, the more people that depend on an actor to make connections with other people, the more power he or she has. Hence, if actors B and C must use actor A in order to make contact between them, the matter raises the betweenness value of actor A. If there are other actors whom B and C may use in order to make contact, it will reduce A’s level of betweenness. For an illustration, see Figure 3 in which Muhammad Abu Varda is the only connection between two other actors and the network, hence he poses a high level of betweenness compared to other actors. In this study, we used Freeman’s betweenness measure.26

The second type of analysis is designed to help map out the network social structure by locating the subgroups within it. The concept most often used in this context is “clique.” In a subgroup that is a clique, every actor is connected to all the other actors.27 However, sometimes there are subgroups in the network that do not fit the definition of a clique, i.e., not every actor in the subgroup has ties with all the other actors, but rather to most of them. In order to identify these other subgroups, K-core groups analysis was used.28

**Networks of Suicide Bombers**

In order to map out the social networks of Palestinian suicide bombers, data was culled from a broad spectrum of information sources such as the international press, Internet sites of the groups themselves, and studies and articles that dealt with the phenomenon of Palestinian suicide attackers.29 Information was collected in regard to the actors comprising each network, the ties among them, and the nature of these ties. Matrices
were then constructed for each one of the networks and processed by means of UCINET 6 software.\textsuperscript{30} We have generally distinguished among three different levels in the intensity of personal ties. The strongest ties are family ties, the second in importance is a long-term friendship, and the third is an earlier acquaintance (such as a person met at work, school or in an Israeli prison).\textsuperscript{31}

Table No. 1 around here

According to Table 1, which features a list of their characteristics, networks were primarily active after the year 2000 (except the Nablus one) and in different geographic regions (Nablus, Jenin, northern Samaria, and Hebron). The total number of suicide bombers in all four networks was 42 and constitutes nearly 22 percent of the entire population of Palestinian suicide attackers. The finding that 35 more suicide bombers were found to be connected to other networks and that many others were not affiliated with any organization, underscores the tendency in which networks are replacing organizations as the main elements responsible for initiating suicide attacks. Table 1 shows an average of 2.75 hubs in each network. The level of density (which expresses the number of ties and their intensity) in the Hebron network is exceptionally high compared to that of other networks, mainly due to its multiple family ties—a matter that will be addressed at length later on in this paper.

It is particularly worth noting that most networks are not homogeneous in terms of the organizational ascription of their members. Some members identified with or operated in different groups or did not belong to any group prior to becoming part of the network. In order to reinforce our assumption that, following intensive Israeli operations against Palestinian groups in the year 2000 and afterwards, the organizational structure began to
be replaced by the network, we have included a control group in this study—the Nablus network, which was active already in 1996. Indeed, Table 1 shows that unlike the newer networks, the Nablus network was conspicuous for its relative homogeneity with respect to the organizational affiliation of its members.

**Motivations of Hubs**

As anticipated, all the networks examined had a limited number of hubs operating the network. Table 2 shows the hubs in each of the four networks we analyzed and their characteristics.\(^ {32} \)

**Table No. 2 around here**

The overwhelming majority of hubs displayed high levels of centrality, closeness and betweenness in the network. This means that they are not only the most connected actors among members of the network, but are located at strategic nodes which enable them to reach most of the actors with relatively few steps and without the need for many mediators. Furthermore, hubs were also the main element connecting subgroups within the network. These findings show that the hubs are the network’s driving force—the element that ties together all components of the network (logistics, intelligence, recruitment and dispatching). This is in contrast to “regular” actors, who know only a few other actors in the network and mainly those relevant to the fulfillment of their roles.

Therefore, in order to understand the factors leading to the formation of the network and the initiation of suicide attacks, we must examine the main motivations underlying the hubs’ actions and trace their management of the network. This does not mean that the strategic considerations of organizational elites and the personal motivations of suicide
bombers are negligible; nevertheless, they have less significance in the context of networks because the central leadership’s control over local cells has proven to be extremely limited and the suicide bomber profile has shown to be of secondary importance in understanding the phenomenon.

Our study found that most hubs had two prominent distinctions. First, none of them have previously held senior positions in the various organizations. Most indeed had operative qualifications (Muhi a-din Sharif, who was an engineer) or political talents (Keis Adwan, who headed the Al-Najah Student Union) but they did not make an impact beyond the local arena.33 Second, they all had a long history of confrontation with Israeli security forces.34 Some of them had served time in Israeli jails and most of them had seen their loved ones harmed or killed by Israeli security forces. For example, Muhi a-din Sharif, the hub of the Nablus network, was a close disciple of Yehiya Ayash (also known as, “the engineer”), one of the leaders of the military arm of Hamas in the mid-1990s, and when Ayash was eliminated by Israel, Sharif put his energies into setting up a network of suicide bombers. He recruited small cells of activists based in the Nablus area and belonging to the Abu Varda family—one of the biggest families in the region—in order to conduct a campaign of retaliation against Israel following Ayash’s assassination.35

Hassan Salameh, one of the main activists in the network, said in an interview that the motivating factor behind the network was not a strategic interest but the desire for revenge.36 Keis Adwan, the hub of the network in northern Samaria, had also lost a number of close associates due to Israeli security forces operations.37 The death of his friend and apartment co-resident, Zachariah Kilani, at the beginning of the Intifada, probably was the final push that drove him to establish a network of suicide bombers.38
Despite the evidence that some hubs were motivated to a certain degree by personal factors, we believe that the main motivation for their actions was the struggle between the local networks that developed during the Al-Aqsa Intifada in various parts of the Palestinian Authority territories. This assertion reinforces Bloom’s arguments, but on a different analytical level. In other words, the campaign of suicide bombers was the result of competition stemming from a desire to gain political power, but this competition was on the local, not the national, organizational level.

An example is the Hebron network operated by heads of the Kawasmeh clan. The activities of this network began as a result of the continuing struggle with the local rival network led by Mohamed Sidr, head of the Palestinian Islamic Jihad in Hebron, over control of the city and the support of the local population.\(^{39}\) Accordingly, the successful attack committed by Sidr’s network in November, 2002, in which Hebron IDF Commander Dror Weinberg was killed—an attack that earned the network considerable prestige—was one of the prominent events that motivated the Kawasmeh family to begin recruiting activists from the local soccer club in order to establish the network.\(^{40}\) This network then went on to execute eight suicide bombings in the following six months.

There was also fierce competition waged between two other networks, the one in northern Samaria and the one in Jenin. While they were at odds over an area of overlying operational regions, the intense competition between the two found expression mainly in the dispatching of a series of suicide bombers in response to the successes of the other network’s suicide bombings.\(^{41}\)

In an interview with an aide to Jamal Abu Al-Hija, the hub of the northern Samaria network, he likened the competition in Jenin to a type of sporting contest between local
soccer clubs struggling for status and their spectators’ admiration. Other operatives repeated the fact that competition between local networks was an important factor leading to the launching of suicide attacks. Competition was so intense that sometimes the networks hastened to take responsibility for operations even before it became evident whether they had been carried out by their own members or not—just to deprive the rival network of the dividends of public support.

Thus, for example, after the suicide attack at the Sbarro restaurant in Jerusalem, the Jenin network was quick to take credit even though the attack was perpetrated by the northern Samaria network. An examination of the timing of the suicide attacks by the two networks also illustrates the intense competition that developed between them. After the perpetration of four suicide attacks from December 2000 to April 2001 by the northern Samaria network, the Jenin network responded with five suicide attacks between May and August of that same year. From then on, the two networks continued to initiate suicide attacks alternately, each of them rushing to plaster the streets of Jenin with pictures of the “suicide bomber of the day” after a “successful” attack. Following the rivalry in Jenin, which turned the city into a main source of suicide attack initiatives in the West Bank, the Israeli army invaded the city in August 2001. The rapid withdrawal of the Israeli security forces, however, allowed competition to resume until the commencement of Operation Defensive Shield on March 29, 2002. In the wake of this Israeli military assault of unprecedented force, the networks united and operated together.

To conclude this discussion, we would like to stress two important issues. First, by trying to detect the factors that led to the formation of the networks and the execution of suicide
attacks, we do not mean that they were not entirely influenced by strategic considerations. These were manifested in two dimensions. First, all networks were operating in the wider context of the Palestinian-Israeli conflict and viewed their acts as part of the Palestinian struggle for sovereignty. Second, in rare cases, the networks initiated suicide attacks under the inspiration of strategic aims. One example was in order to demonstrate to the PNA (Palestinian National Authority) that it could not act without taking their stance into consideration.\textsuperscript{47} They consequently used suicide attacks to sabotage the negotiations between Israelis and Palestinians that they rejected. For example, the Hebron network initiated a suicide attack on May 17\textsuperscript{th}, 2003, a day after meetings between Prime Minister Sharon and Palestinian Prime Minister Abu Mazen. This same reason led the Jenin network to launch suicide attack in May 2001 after publication of the Mitchell Report.\textsuperscript{48} The other strategic aim was to deter Israel from continuing to assassinate Palestinian leaders. Hence, they initiated attacks in response to Israel’s targeted killings of Palestinian leaders. This was the case in the attack perpetrated by the northern Samaria network in December 2001, which was in retaliation to the liquidation of a prominent Hamas leader, Mahmoud Abu Honod, by Israel just a few weeks earlier.\textsuperscript{49}

However, and this is the second issue we wanted to stress, despite the fact that hubs were sometimes influenced by strategic considerations, they operated independently with respect to the management of their networks. Although they maintained ties with the leadership of groups in whose name they were ostensibly operating, the fact that the organizational highest ranks were located outside the Palestinian Authority territories and Israel, restricted the leaderships’ ties with the hubs to providing financial assistance and
general guidance. Operational assignments, choosing the timing for each campaign and the management of the network were in the hands of the hubs. In an interview with Tabat Mardawi, the hub of the Jenin network, he confirmed all these details and even added that the leaderships of the groups received reports only after the attacks. The main purpose of reporting was to enable a certain group—with which the network wanted to be affiliated—to accept responsibility for the act. The organizational affinity of the hubs themselves was of little significance and purely instrumental. Hubs would not hesitate in switching their allegiances with groups in order to make the most of changing interests. This means that in contrast to the prevailing perception, which views suicide attacks as a product of strategic decisions made within organizational frameworks, to a great extent, decisions were actually made by local activists, and struggles between local and family groups proved to be the best predictor of these decisions. After pointing out the motivations behind the initiation of suicide attacks, we will now explain how the network is formed and operates.

**Network Characteristics**

In general, a number of prominent features were common to all the networks we examined. First, was their size. All networks consisted of only a few dozen activists. This restricted size seemed to stem from the need to establish an operational infrastructure that on one hand could carry out suicide attacks together with all the pertinent operational aspects, including intelligence, logistics, assistance with transporting the suicide bomber, etc., and, on the other, the need to maintain a certain level of secrecy. The number of activists in these networks ranged between 20 and 50 members and this amount was able to fulfill both these needs.
Second, all networks had hubs who were connected to most actors. If we refer to Arquilla and Ronfeldt’s abovementioned network typology, the networks structure is somewhat an intermediate model between the star network form that characterized Al-Qaeda prior to the invasion of Afghanistan, where there was one main hub (central command) directing all other nodes, and the “all channel mode” form illustrated by the current network of the global jihad, where there are no hubs and all nodes are connected to all others. However, the fact that the networks we found were scale-free means that they did not develop arbitrarily or without a guiding hand, but rather that, over the course of time, their hubs proved to be the main vehicle in getting various actors to join the network.

This assertion found reinforcement when we examined the recruiting methods of the various networks and the types of preliminary ties between recruiter and recruit. For example, in the Hebron network, we identified two sources of recruitment. Some of the suicide bombers were recruited by heads of the Kawasmeh clan from within the extended family with a focus on youngsters who were members of the soccer team of the local mosque. One of the hubs, Abdullah Kawasmeh, would visit the soccer team members on a regular basis and thus succeeded in recruiting additional youths from outside the clan. The second source of recruitment was Hebron’s Polytechnic Institute, whose offices are located in the Abu Ktila neighborhood where the Kawasmeh clan lives. The hubs knew some of the students who studied at the Institute and took advantage of this earlier acquaintance when mobilizing new recruits.

In the northern Samaria network, Keis Adwan exploited his position as former head of the Al-Najah Student Union to recruit students to his network while Norsi Tualbe, hub of
the Jenin network, worked with other hubs to select candidates from within their extended families and circle of friends. Thus, for example, Norsi Tualbe sent his 18-year-old brother Morad to carry out a suicide attack in Afula (in the end, Morad changed his mind and did not blow himself up).\textsuperscript{59}

From the examples above we can conclude that network activists were largely recruited from the surrounding community using social ties, thus emphasizing the importance of collective support for the network.\textsuperscript{60} These characteristics are not unique to terrorist networks, but also can be observed in other types of social networks such as urban street gangs.\textsuperscript{61} In both cases, membership in networks that are supported by the community is a source of status, identity, cohesion, self-esteem and also provides a sense of belonging.\textsuperscript{62} Moreover, in both cases,\textsuperscript{63} the support and tolerance of the community is an important factor that motivates the network to continue its operations and consequently makes it easier to recruit new members by increasing what Klandermans and Oegema described as “mobilization potential.”\textsuperscript{64} Taking into account the obvious differences, it seems that the same process of alienation of community residents from the government and its officials which led to the emergence of violent street gangs\textsuperscript{65} also facilitated the emergence of local Palestinian networks. In the latter case, it was the alienation of the local Palestinian community from Israel and the PNA that fueled their galvanization. The main conclusion is that while terrorist networks differ from other less radical social networks or social movements in many respects, there is much resemblance in their inter-group dynamics and relations with the surrounding community.

To conclude the above analogy, in regard to street gangs, support of the community is mostly passive,\textsuperscript{66} whereas, in the case of Palestinian networks, social support has the
potential to be highly active. For example, after Nors Tualbe, the hub of the Jenin network, was arrested by the PNA, thousands of Jenin residents took to the streets in protest, so that, after a few days, the PNA decided to release him. Strong support of the surrounding community was also evident in the case of the northern Samaria network, as well as with the Hebron network, which benefited from the fact that it was headed by one of the strongest and largest families in the city.

A third characteristic that most Palestinian networks share is the peripheral nature of the suicide bombers in the networks. Findings presented in Table 3 support the assumptions of most researchers in this field, i.e., the suicide bomber is a weapon in the service of the elite which prefers to send individuals who are of minor importance and who contribute little to the continued operation of the network.

Table No. 3 around here

As shown in Table 3, the average ratings of suicide bombers were considerably lower than the average of all network actors on all parameters: centrality, closeness and betweenness. The F-test for verifying the disparities between suicide and non-suicide bomber populations among the total network population in fact showed significant gaps in levels of closeness and betweenness. This implies that suicide bombers had no direct or indirect acquaintance with most network members. Of course, there is an operational logic to this practice, considering the fact that the suicide bomber is the actor with the greatest chances of being caught and it is therefore imperative that he or she possess as little information as possible regarding the network. Suicide bombers also cannot be nodes that link between subgroups in the network, because if they were, their suicide would lead to its disintegration. Figures 3, 4 and 6 in the Appendix, which represent
suicide bomber networks in Nablus, northern Samaria and Jenin, illustrate the peripherality of suicide bombers and their position on the outermost circle of the network. Figure 5 in the Appendix, showing the Hebron network, looks somewhat different. The suicide bombers in this network are not as peripheral compared to the bombers in the other three networks. The reason for this is that this particular network is based mainly on one extended family. All the suicide bombers therefore had some level of acquaintance with other members of the network. The distinction between the networks therefore leads us to assume that the more the structure of a network is based on strong or primordial ties, the lesser peripherality of the suicide bombers.

The fact that the status and roles of hubs and suicide bombers are identical in the different networks prompts us to assume that actors with similar locations in the various networks will adopt roles with similar features. Hence, in the next stage, we will try to identify subgroups with distinct roles that are present in all the networks. To this end, we conducted K-core analyses (Figures 7-10 in the Appendix), which provided an efficient method for identifying the subgroups in each network.

These analyses showed a connection between the roles of the actors in a network and their internal division into subgroups. Although the results do not totally correlate with the actors’ roles in the network, and sometimes there is overlap among subgroups, it is still possible to see that the networks, apart from the one in Hebron, consist of four types of subgroups: 1) The hubs and main activists; 2) subgroups of collaborators on different levels that sometimes also include suicide bombers; 3) subgroups of suicide bombers that sometimes also include a number of peripheral activists; 4) suicide bombers who are so
peripheral that they do not belong to subgroups in the network, or who, along with another bomber, constitute a tiny subgroup.

The best correlation between subgroups and the division of roles in the network can be seen in the Nablus network. Hubs and main activists form one subgroup. Alongside, a group of collaborators also constitute a subgroup. As for the suicide bombers, these belong to two small subgroups comprised only of bombers. In fact, every two suicide bombers formed a distinct subgroup. The reason for the division between the two subgroups of suicide bombers was related to the timing of their recruitment and where they lived. While one subgroup of suicide bombers was from the Nablus region, the suicide bombers in the other subgroup came from the Al Fawar refugee camp. These circumstances, combined with the fact that there was no such distinction between the various subgroups in the Hebron network (since all members had multiple family ties and lived in the same place), shows that the composition of subgroups is also affected by socio-demographic variables with respect to suicide bombers. This further reinforces the assumption that new members are recruited to the network through acquaintance, friendship, or family ties that developed in distinct geographic areas and not as a result of a recruitment process the way it is done in organizations.

We would like to conclude the current discussion with an examination of the relationship between the network’s structure and its degree of effectiveness, mainly, its ability to carry out a large number of suicide attacks. To this end, we compared the Nablus network, which managed to carry out just four attacks, with the Jenin, northern Samaria and Hebron networks, each which perpetrated more than double that number.
There were three prominent differences between the two groups. First, was their size. The three more successful networks had more members. Second, the number of cliques in each successful network was considerably greater than the number in the Nablus network. While we observed just nine cliques in the Nablus network, there were 24 in the northern Samaria network, 75 in Hebron, and 118 in Jenin. Even though the number of cliques also depends on the number of members in the network, there was still a greater relative disparity in the number of cliques than the relative disparity in the number of members in each network. This means that the existence of cohesive subgroups within a network had proven to be a predictor of the network’s effectiveness. However, the main factor affecting the network’s success rate was the number of hubs operating in it. As we can see, the more hubs a network has, the more suicide attacks it carries out. Thus, for example, while the Nablus network had just one hub, the other networks had between two and five hubs. The explanation for this connection is that when a network has more hubs, they can assist in the preparation of the infrastructure before each operation, which increases the ability to carry out more attacks and sometimes even parallel attacks.

In order to confirm this statement, we identified the number of actors in each network who were highly connected to other members, even though they did not meet the criteria for being defined as hubs. We found that while the Nablus network had three such actors, the Hebron network had ten, the Jenin network had eight and the northern Samaria network, four. In this context, it is important to note that the size of the network was not an advantage if there were only a few hubs. A network with a large number of members but which is dependent on just one hub will have difficulty in being effective. This is
because the regular actors, who do not have many ties in the network, have limited ability in recruiting enough actors to the network for carrying out a suicide attack.

In conclusion, the connection between the number of hubs and the effectiveness of a network also has to do with the fact that a larger number of hubs significantly increases the resilience of the networks. We will expand on this in the next section, which deals with the question of how to cope with suicide bomber networks.

**Coping with Suicide Bomber Networks**

Scale-free networks have two basic qualities that affect their resilience. First, they can withstand random failures. Since there are far more regular members than hubs, the chances of a random injury or elimination of a hub are low. By the same token, the loss of one of the regular actors will not cause the disintegration of the network, since the hubs allow the network to continue operating due to their high level of connectedness. That is why regular army units can sustain 30% casualties before they become ineffective while networks have been shown to endure 70% attrition rates and still maintain operational abilities. Even so, the second attribute of scale-free networks assumes that damage to one of the hubs will indeed lead to the speedy disintegration of the network so that the more hubs there are, the greater the resilience of the network against direct attacks.

An illustration of this type of resilience follows: On June 23rd, 2003, Israel assassinated Abdullah Kawasmeh, a hub in the Hebron network. Basel, another hub, continued to operate the network. Three months later, Basel was also killed, and Imad Kawasmeh, who had not previously been a hub, but who did have a high level of connectedness, took over. In the case of the northern Samaria network, after the assassination of Keis
Adwan in August 2002, he was replaced by Jamal Abu Al-Hija, another hub in that network. In Jenin, the death of Nursi Tawalbeh during Operation Defensive Shield led to his replacement by Iyad Sawalha, who ranked sixth in the degree of centrality in the network.

This leads to a number of conclusions. First, it is reasonable to state that after a hub suffers injury or is eliminated, he or she will be replaced by an actor who has the highest level of centrality. Second, in all cases, the replacement hub will be part of the subgroup that included all the network’s hubs. Third, selective attacks against hubs have minor influence on the network, and in most cases do not affect its continued existence.

In conclusion, the analysis of the network structure, the isolation of subgroups of suicide bombers, and the identification of actors who still have not committed suicide in each such subgroup, altogether, hold the potential for calculating which actors have the greatest chances of becoming future suicide bombers. Another possibility in predicting potential suicide bombers is by analyzing the status of suicide bombers in the network on the basis of the three main indexes presented here (centrality, closeness and betweenness). We can assume that network actors whose ratings on these indexes are similar to those of the subgroup of suicide bombers in the network have greater chances of being future suicide bombers. In addition, after the expansion of our database of networks and the standardization of indexes, more complex statistical possibilities should be examined. These could be checked by running models, such as, logistic regression, that are capable of predicting which actors have the highest potential for becoming the next suicide bomber.74
Conclusions

In recent decades there has been a marked increase in the use of suicide bombers in guerilla as well as terror campaigns. This has reached a point where suicide attacks have become an integral and even dominant part of many asymmetric conflicts. This is not a static phenomenon, however. In contrast to most important works in this field which have assumed that the use of suicide bombers is a product of hierarchical organizational systems, and, furthermore, in the wake of changes we observed in the features of this phenomenon in recent years, we decided to adopt a horizontal, rather than hierarchical-formal, approach. The methodical analysis of social networks enabled us to closely examine this phenomenon from a different angle.

The analysis of the Palestinian suicide bomber phenomenon through a network prism has led us to a number of main conclusions. First, networks are local and cross-organizational. They are based mainly on primordial ties of family and friends and many of those who joined the networks never belonged to any organization. In other cases, organizational affiliation was secondary to network membership, which, to a great extent, is a tribal quality. This confirms our contention in regard to the decline in the importance of organizations in producing suicide attacks. Second, networks do not have leaders, but rather hubs. These do not enjoy a formal status, but they do navigate the network’s operations. In most cases, we did not manage to find proof demonstrating that hubs received direct orders from organizations or that their own operations were based on strategic motivation. Still, we did find strong evidence of the use of suicide bombers as a component in the struggle for political power among families or groups on a local level. Third, suicide bombers are not recruited, nor do they undergo a training process. They are
peripheral figures in the network, recruited ad hoc from the environment close to the network for the purpose of carrying out a suicide attack. Fourth, we found that the structure of all the networks and the division of roles were identical. Similarly, we found a consistent correlation between the network’s characteristics and the nature of its operations. Thus, for example, a large number of hubs and subgroups in a network will result in a higher level of effectiveness. This means that despite the amorphous image of the networks, there is a considerable systematic element in the structure and nature of their operations. Fifth, we can gather from the above on how to cope with this phenomenon. For example, we can predict the identity of the potential suicide bombers in a network according to their membership in a certain subgroup and their general position in the network. However, targeting specific hubs will not—in most cases—put an end to the existence and operation of the network.

Despite the limitations of the current research, which was based on the investigation of one arena and on information that was collected from overt sources only, we believe that a close look at arenas of other suicide bombers through a network prism will enable theory to keep pace with the changing empirical reality.
Figure 1- Suicide Attacks Worldwide Per Year

Figure 2- Suicide Attacks Worldwide Per Year by Network and Hierarchical Organizations
### Table 1 – Networks: Descriptive Statistics

<table>
<thead>
<tr>
<th>Network</th>
<th>N</th>
<th>No. of Suicide Bombers</th>
<th>No. of Hubs</th>
<th>Period of Operation</th>
<th>Density*</th>
<th>Members' Orientation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nablus</td>
<td>22</td>
<td>4</td>
<td>1</td>
<td>1996</td>
<td>1.1781</td>
<td>Hamas</td>
</tr>
<tr>
<td>Northern Samaria</td>
<td>36</td>
<td>12</td>
<td>3</td>
<td>2000-2002</td>
<td>1.1071</td>
<td>31 Hamas, 2 PIJ, 2 Fatah and one without orientation.</td>
</tr>
<tr>
<td>Hebron</td>
<td>36</td>
<td>11</td>
<td>2</td>
<td>2002-2004</td>
<td>1.6400</td>
<td>31 Hamas, 5 without orientation.</td>
</tr>
</tbody>
</table>

* The sum of the values of all ties divided by the number of actual ties.

### Table 2 – Hubs: Characteristics and Motivations

<table>
<thead>
<tr>
<th>Network</th>
<th>Hub</th>
<th>Centrality (location in the net)</th>
<th>Closeness (location in the net)</th>
<th>Betweenness (location in the net)</th>
<th>Motivation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nablus</td>
<td>Muhi a-din Sharif</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>Operational capacity</td>
</tr>
<tr>
<td>Northern Samaria</td>
<td>Keis Adwan</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>Competition with other groups over control in the area.</td>
</tr>
<tr>
<td></td>
<td>Jamal Abu Al-Hija</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Nazia abu Sabaa</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Hebron</td>
<td>Basel Kawasmeh</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>Competition with other groups over control in Hebron</td>
</tr>
<tr>
<td></td>
<td>Abdullah Kawasmeh</td>
<td>2</td>
<td>2</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Jenin</td>
<td>Nursi Tawalbeh</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>Competition with other groups over control in the area.</td>
</tr>
<tr>
<td></td>
<td>Tabat Mardawi</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Abu diab</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Yehia Zbeidi</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ali Sfori</td>
<td>5</td>
<td>6</td>
<td>11</td>
<td></td>
</tr>
</tbody>
</table>
Table 3 – Role of Suicide Bombers in the Network

<table>
<thead>
<tr>
<th>Networks</th>
<th>Nablus</th>
<th>Northern Samaria</th>
<th>Hebron</th>
<th>Jenin</th>
<th>Anova – All Samples</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hubs</td>
<td>Members</td>
<td>Hubs</td>
<td>Members</td>
<td>Hubs</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Closeness (Mean)</td>
<td>87.500</td>
<td>56.775</td>
<td>46.200</td>
<td>79.122</td>
<td>53.913</td>
</tr>
<tr>
<td>Betweenness (Mean)</td>
<td>49.760</td>
<td>2.423</td>
<td>.000</td>
<td>27.356</td>
<td>.076</td>
</tr>
</tbody>
</table>
Appendix

* In the following Figures 3-6, suicide bombers are in blue. The hubs are marked as diamonds and members whose organizational orientation is different from that of most of the network are marked with hourglasses.
** Thick lines refer to family relations, intermediate lines are long-term friendships, and narrow lines are acquaintances.
*** In K-cores Figures (7-10), the size of the node is proportional to the K-core size, and colors are used in order to identify the different groups.

Figure 3 – Nablus Network

![Nablus Network Diagram]

Figure 4 – Northern Samaria Network

![Northern Samaria Network Diagram]
Figure 7 – Nablus Network: K-cores Analysis

Figure 8 – Northern Samaria Network: K-cores Analysis
Suicide Terrorism


This graph is based on a dataset consisting of a list of terror incidents perpetrated by suicide bombers worldwide. It covers a period of time beginning in 1982 and concludes on the 2nd of June, 2005, in the explosion of a car bomb driven by unknown terrorists in Balad, Iraq. In all, the catalogue includes 624 suicide assaults which took place in 28 different countries and were carried out by 32 different organizations. The database was compiled in several stages and is the property of the National Security Studies Center in the University of Haifa. First, data was collected from various academic sources (articles and books) in order to identify the countries, organizations and periods which have proved to be a part of the realm of suicide terror. In the second stage, each region and group of organizations was assigned to a researcher, whose function was to search for information on suicide attacks that were relevant to their assigned domain. The sources of information on which the database was established are numerous and diverse: articles and academic texts (Encyclopedia of World Terrorism, 1997; Almanac of Modern Terrorism, 1991; Pape, 2003), databanks found on the Internet (Cdis Terrorism Programme, MITP knowledge base, ICT Database), Internet sites dealing in various terror organizations or terror in the world, as well as a broad use of local and international media sources. In the final stage, the amassed information was encoded in an SPSS file according to the specific variables chosen.


In Southeast Asia, for example: Although different groups cooperated with Al-Qaeda, the core aims were separate and mostly local. See: David, M. Jones, Michael, L. Smith and Mark Weeding, 2003. “Looking for the Pattern: Al Qaeda in Southeast Asia—The Genealogy of a Terror Network.” Studies in Conflict and Terrorism, 26, 443-457.


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Terrorism in Comparative Perspective.” In Countering Suicide Terrorism: An International Conference, Herzliya, Israel. The International Policy Institute for Counter-Terrorism at the Interdisciplinary Center Herzliya; Ariel Merari. 1990. “The Readiness to Kill and Die.” In Origins of Terrorism, edited by W. Reich. Cambridge: Cambridge University Press;


To illustrate; on August 29th, 2003, the hudna between Israel and the Palestinian Authority was announced. In the framework of this agreement, Israel committed to granting a series of gestures such as removing roadblocks, freeing prisoners, and evacuating strongholds. Some of these gestures, including an Israeli obligation to restrict its military actions, were designed to serve the interests of Palestinian groups, including Hamas and the Islamic Jihad. Nevertheless, suicide attacks continued to occur, essentially bringing an end to the hudna. Examples were during the month of July, 2003, when a suicide bomber blew himself up in the village of Kfar Yavetz, and on August 12th of the same year, when suicide attacks were carried out in Rosh Haayin and Ariel.

At least eight suicide attacks were executed with inter-organizational cooperation. Among the more prominent ones was the attack mounted on the Ashdod Port in March, 2004—a joint aggression committed by the Hamas and Fatah, and the suicide attack on the old Central Bus Station in Tel Aviv perpetrated in January, 2002, by the Islamic Jihad and Fatah.


They present three types of networks: 1) “chain” network, which links two ends of an organization via a series of intermediaries; 2) “star” – various nodes are linked independently to a central hub; 3) “all channel” – all nodes are connected individually to all other nodes. See: Jhon Arquilla and David Ronfeldt. Networks and Netwars: The Future of Terror, Crime, and Militancy. Santa Monica, CA: Rand, 2001, p.7-8.


The average time preparation for one-third of all Palestinian suicide bombers was 10 days, and 60% of all bombers were launched within a month. See: Ariel Merari. 2004. Palestinian Suicide Terrorism: Facts, Explanations, and Countermeasures. Paper presented to the National Institute of Justice Professional Conference Series, October 25-26, 2004.


A K-core is a maximal group of actors, all of whom are connected to some number (k) of other members of the group. The K-core approach allows actors to join the group if they are connected to k members, regardless of how many other members they may not be connected to. For additional information, see: Introduction to Social Network Methods: http://faculty.ucr.edu/~hanneman/nettext/C11_Cliques.html;
Although we are aware of the existence of additional types of ties and ties of varying intensity—which if encoded into the matrices would have improved the precision of the networks—limitations in access to information compelled us to adhere to the three levels mentioned.

The literature suggests a variety of ways for identifying hubs; most of them refer to the degree of centrality as a main element in this process. Hence, for the current study, we established that hubs will be actors whose level of centrality is more than twice the average level of centrality of all network actors. See: Stanley Wasserman and Katherine Faust. 1994. Social Network Analysis: Methods and Applications Cambridge: Cambridge University Press. Pp. 178-180.


While other members in the networks were also involved in confrontations with Israeli security forces, these were more often specific incidents and not continuous confrontation as in the case of the hubs.


Ibid.


For example, Abbas Sayad, the recruiter of the suicide bomber who exploded himself at the Park Hotel on March 27th, 2002. See: Amos Harel. “Almost all Park Hotel bombing plotters are dead or in custody”. Haaretz (English edition), May 16, 2002.


Karin Laub. “Palestinian vote approves first prime minister; Tel Aviv bombing kills three hours later”. Associated Press, April 29, 2003. Also see interview with Hamas spokesmen Abd-al-Aziz al-Rantisi in “Hamas official vows to continue to "incite" against Israeli "killers". Al-Jazeera TV, 1314 gmt 29 Apr 03.

The Mitchell Report was published on April 2001 and investigated the factors that led to the emergence of the Al-Aqsa Intifada. It called both sides to stop their violent acts.


55 Scale-free networks indicate a situation in which the network includes, aside from “regular” actors with an average amount of ties, several actors with a number of ties well above the average. In this type of network, we can assume that the structure is developing and growing due to the hub’s activity and his or her abilities to create new ties and expand the network. See: Albert Laszlo-Barabasi and Eric Bonabeau. 2003. “Scale-Free Networks.” Scientific American, 288 (5): 60-69.

56 The fact is that in most social movements and not just violent ones, prior contact between the recruitment agent and the recruit is necessary. Hence social networks are important factors in the growth of such groups. See: David A. Snow, Louis, A. Zurcher and Sheldon Ekland-Olson. 1980. “Social Networks and Social Movements: A Micro-Structural Approach to Differential Recruitments.” American Sociological Review, 45: 789.


60 If we refer to the typology of recruitment procedures in social movements as presented by Snow, Zurcher and Olson, we can say that the recruitment is conducted “face-to-face” by means of private channels. See: David A. Snow, Louis, A. Zurcher and Sheldon Ekland-Olson. 1980. “Social Networks and Social Movements: A Micro-Structural Approach to Differential Recruitments.” American Sociological Review, 45: 789.


We refer to cliques that include at least three members.

Their degree of centrality was not twice the average degree of centrality of all the network actors (as with the hubs) but only 50% higher.


73 70% above the average degree of centrality of network members.