A Social Network Analysis of Aum Shinrikyo: Understanding Terrorism in Australia

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Social network analysis offers the ability to firstly map a covert cell, and to secondly measure the specific structural and interactional criteria of such a cell. The method also endows the analyst the ability to measure the level of covertness and efficiency of the cell as a whole, and also the level of activity, ability to access others, and the level of control over a network each individual possesses. The measurement of these criteria allows specific counter-terrorism applications to be drawn, and assists in the assessment of the most effective methods of disrupting and neutralising a terrorist cell. This article will attempt to contribute to and advance the growing literature on social network analysis and terrorism studies through a social network analysis of the Japanese Aum Shinrikyo cell that produced the toxic nerve gas Sarin in Western Australia between early 1993 and late 1994. Through this application, this article will endeavour to provide research into terrorism in Australia, more specifically, understanding and explaining the operations and elements of the *modus operandi* of terrorist groups in Australia, an area which has received critically little attention.

Keywords: Aum Shinrikyo; social network analysis; terrorism; terrorism in Australia; Shoko Asahara.

Despite a reasonably significant history of terrorism in Australia, there has been very little research on terrorism in this country. There have been some significant works in the field that have examined the phenomenon of terrorism in Australia, such as Clifford's 1981 article, 'Terrorism: Australia's Quiet War', which examined the history of terrorism in Australia, and the balance between liberty and security in counter-terrorism measures and legislation.[1] Wardlaw's article 'Terrorism and Public Disorder: The Australian Context', examined the validity of the threat of terrorism in Australia in contrast to the sensationalisation of the phenomenon by the Australian media.[2] *Australia: The Terrorist Connection* by Crown in 1986 added to the academic literature within the field. Crown's book examined Australia's position within the 1980s world of International Terrorism, and moved to discuss hypothetical terrorist events in Australia and the counter-terrorist responses that the Australian Government had in place.[3] Crown offered his assessment of terrorism studies in the Australian context:

> far too little has been written about the terrorist threat and the potential for politically motivated violence this country faces…In order to document the facts I have quoted throughout this book I have turned to the only source of record available on the Australian scene – newspapers, magazines, and the recollections of individuals involved and the journalists who reported these incidents.[4]

Six years later, Hocking met the call of Crown in her book *Beyond Terrorism: The Development of the Australian Security State*, which provided a comprehensive account of the development of Australia's intelligence agencies. In this piece Hocking examined in detail the justification and legality of the call out of the Australian

Defence Force in the wake of the 1978 Hilton Bombing.[5] Hocking added to this book in her 2004 *Terror Laws: ASIO, Counter-Terrorism, and the Threat to Democracy* which examined the anti-terrorism legislation introduced into Australia following the al-Qaeda attacks in the United States (US) in 2001, and the Jemaah Islamiyah (JI) bombing in Bali in 2002.[6]

This brief review illustrates that while there have been valuable contributions to the Australian context of terrorism studies from the legal, historical, and counter-terrorism perspectives that focus on descriptive summaries of terrorist groups and events, there has been little substantive analysis that focuses on a richer understanding of the various aspects of the *modus operandi* (particularly the communication, interaction, and formation) of terrorist groups that have operated in Australia. The pursuit of such understanding promises to advance the field within Australia and provide significant counter-terrorism applications and insights.

The objective of this article is to contribute to this area by synthesising the initial results from the author's doctoral thesis, which conducts a Social Network Analysis of three terrorist cells that operated in Australia: the Croatian Revolutionary Brotherhood, *Aum Shinrikyo* (Supreme Truth), and *Laskhar-e-Taiba* (Army of the Pure/Righteous). The thesis will also examines the JI cell behind the 2002 Bali bombings for projections of how the group would operate in future operations, and in Australia.

This article will conduct a social network analysis to map and measure the network criteria of the Aum Shinrikyo terrorist cell that operated in Western Australia in 1993. This analysis will attempt to provide significant insight and understanding into the communication and interaction within this terrorist cell. From this analysis, destabilisation techniques will be applied to the cell in an attempt to discover appropriate counter-terrorism applications for their use against future cells that operate in a similar fashion.

Social Network Analysis

Social network analysis is a methodological form of analysis that is based on mathematical, psychological, anthropological, and sociological applications of interaction and communication.[7] This framework aims to connect the dots between individuals and "map and measure complex, sometimes covert, human groups and organisations".[8] The method focuses on uncovering the patterning of people's interaction,[9] and correctly interpreting these networks assists "in predicting behaviour and decision-making within the network".[10] Furthermore, the "ability to understand and predict behaviour of members in a social network allows the analyst to evaluate specific courses of action that will influence the members of a social network in a desirable manner".[11] In short, social network analysis "provides a useful way of structuring knowledge and framing further research. Ideally it can also enhance an analyst's predictive capability".[12]

Method

This social network analysis will be conducted through four stages: 1) The Contextual Background; 2) the Relational Data Stage; 3) Network Criteria Analysis, and; 4) Destabilisation Techniques.

Contextual Background

The contextual background essentially aims to comprehensively document the physical environment of the network, the group itself, the individuals within it, and the interaction between these individuals.

Relational Data Stage

The relational data stage identifies the individuals that are considered to be within the cell, and the relations between them through the contextual background. These relations are stored within a binary member by member adjacency matrix. In this matrix, an interaction between two members is illustrated with a 1, while no interaction between members is signified by a 0. This merely indicates whether a relationship exists or not. It was not possible to further detail and measure the strengths of the levels of interaction between the Aum Shinrikyo members within this analysis; as such data does not exist and is only known to the Aum members who were on the property. From the binary matrix, the cell will be mapped through the construction of a sociograph; this will be done through the network analysis program UCINET Version 6.69.[13]

Structural Criteria Analysis

The third stage will calculate the structural criteria of the network. The network and individual level structural criteria that have been employed in this analysis are: Size; Density; Degree of Connexion; Average Communication Speed; Actor Degree Centrality; Betweenness Centrality; Closeness Centrality, and; Clusters.[i] These criteria will be determined through the traditional equations employed within the field, and will be calculated through UCINET. The results will be standardised as a percentage (for density, average communication speed, centrality, closeness, and betweenness), a score of 0 being the lowest possible score, and 100 the maximum.

Size
The size measure is simply the number of nodes within the dataset, however Boissevain describes size as the “most important structural criterion of a…network…this is because the other criteria are calculated as a proportion of the total possible or actual links in the network”.[14]

Density
Density is described as the “the average proportion of lines incident with nodes in the graph”,[15] or “the extent to which links that could possibly exist among persons do in fact exist”.[16] A high density indicates that the network has a high level of efficiency but a low level of covertness, conversely, a low density score means that the network has a high level of covertness, and a low level of efficiency.

Degree of Connexion

[i] Measures such as the Clique Count have been disregarded, as they are ineffectual when examining the Aum network.

This criterion allows the measure of the average number of relations each member has with other members of the network.[17] This criterion can qualify the results of density equations, and allow further comparative analysis between networks.

Average Communication Speed
The average communication speed is calculated through the average shortest path between each node in the network. This measure further assists the density and degree of connexion measures in determining the effectiveness of the communication within the cell. This measure is very useful when attempting to destabilise these networks, and comparing the reduction in information flow and speed.[18]

Actor Level Degree Centrality
Actor level degree centrality is the level at which a node is accessible to the other individuals within the network. Centrality is affected not only by the size of a network, but by the formation and shape of the network.[19] This measure assists the analyst to identify the leaders within networks, this does not entail that they necessarily hold the power in the relationships or indeed the network, however an individual's centrality indicates a critical importance within the network.

Closeness Centrality
The second individual level measure is closeness centrality. Closeness describes how close an actor is to others in the network, or the ability of actors within a network to access others.[20] This is a vital measure that assists in assessing the importance of each node in the context of their network.

Betweenness Centrality
The betweenness structural criterion is another measure of an individual's activity/ability within a network, measuring the ability to control the flow of information within a network.[21] Like the other measures of centrality, this criterion allows the identification of individuals with greater ability to control the communication and exchange within a network.

Clusters
The final structural criterion was the clusters measure. Clusters are sections of a network that are have a higher density than other sections. As such, more dense clusters are areas of a network with higher efficiency.

Destabilisation Techniques

In their paper, *Destabilising Networks*, Carley, Lee, and Krackhardt[22] propose three indicators of destabilisation within a network. The first is "where the rate of information flow through the network has been seriously reduced, possibly to zero".[23] The second is "that the network, as a decision-making body, can no longer reach consensus, or takes much longer to do so".[24] The third indicator of destabilisation is "that the network as an organisation, is less effective; eg, its accuracy at doing tasks or interpreting information has been impaired".[25]

Counter-terrorism techniques traditionally aim at neutralising members of terrorist networks either through capture or death. The removal of a node from a network can make a cell less able to adapt, reduce its performance, reduce its ability to communicate, or have no effect at all. [26] The structural criteria outlined above allow the identification of the most important and well connected individuals within a network, through their high centrality scores. These nodes are known as the 'critical' nodes within a network.[27] The removal or isolation of these nodes ensures maximum damage to the network's ability to adapt, performance, and ability to communicate. As this article examines small scale *cells* as oppose to large scale *networks*, disruption techniques aimed at immediate and maximum disruption will be employed.

In endeavouring to effectively destabilise the networks examined within this project, the analysis has employed the program ORA: Organisational Risk Analyser Version 1.5.5.[28] The program will be used to determine the immediate effects of attempts to disrupt the cell, through the breaking of linkages, and the resulting reduction in capacity of that cell. The disruption techniques will also attempt to separate the major components of the cell. For example, attempt to isolate the bombing team from the command team, or the bomb makers from the suicide bombers (if the network allows for such isolation).

Aum Shinrikyo

Shoko Asahara officially formed Aum Shinrikyo as a religious cult in 1987,[29] the group's religious doctrine espoused a combination of Tibetan Buddhism, Hindu theology, and yoga.[30] This was combined with the belief that in 1997, World War III would begin through a conflict between the US and Japan, resulting in the Apocalypse.[31] The cult was organised into ministries that mirrored the Japanese government, in order for a smooth transition when Aum take power.[32] Following political failure, Aum Shinrikyo began militarisation and a chemical weapons program, developing the nerve gases Sarin, Tabun, Soman, and VX, and the biological agents Botulism and Anthrax. Aum also unsuccessfully attempted to procure the Ebola virus in Zaire.[33]

Aum Shinrikyo conducted the sarin attacks in the Tokyo subway system that killed twelve and injured thousands in 1995, and the sarin attack in Matsumoto in 1994 that killed seven. Aum also sprayed a non-lethal strand of anthrax into the air in Tokyo. By 1995 Aum had between 40 000 and 60 000 members all over the world, and combined holdings of US$1 billion.[34]

Aum Shinrikyo: Contextual Background

This contextual background is a short synthesis of a more detailed and comprehensive background that the relational data for this project was attained from and only concerns the stage at which the group is considered to have operated covert in its operation.[ii] In early September of 1993, two Aum Shinrikyo members, Kiyohide Hayakawa (the second in command of Aum and Construction Minister) and Tsuyoshi Maki, arrived in Australia and purchased the Banjawarn sheep station 600 kilometres north-west from the Western Australian capital, Perth (after a previous visit to and tests conducted on the property) for A$540 000.[35]

On the 9th of September, just days after the purchase of the Banjawarn property, a large group consisting of Aum's Ministry and scientific personnel and experts arrived in Perth from Tokyo.[36] This group consisted of 25 members of the sect, and included seven heads of Aum's Ministry, and general Aum members of varying rank.[37] The flight manifesto included Shoko Asahara, (the Aum Shinrikyo leader), Seiichi Endo

[ii] The period at which the cell is at its most dangerous, usually just before it conducts a terrorist strike.

(Minister of Health and Welfare), Tomomitsu Niimi (Minister of Home Affairs), Hideo Muari (the Minister of Science and Technology, and astrophysicist),[38] Tomomasa Nakagawa (Aum Household Agency Director), and Yoshihiro Inoue (head of Aum's Intelligence Agency).[39] These heads and ministers were accompanied by 19 other senior to low ranking Aum members including: Aum chemist and physics graduate[40] Tooru Toyoda, who was undertaking his doctoral studies and was a member of the Chemical Brigade within the Ministry of Science and Technology, Yutaka Onaya, Yuki Kakinuma, Satoru Go, Satoru Shinohara, Hideaki Tatsuta, Wakashio Togashi, Naruhito Noda, Akira Hori, and physicist and member of the Chemical Brigade, Kenichi Hirose. While the visa applications of most of these individuals read 'office worker', most held advanced qualifications in the fields of science and technology.[41]

Following the main group's arrival at Banjawarn, the individuals at the property who were not members of the cult were asked to leave for the duration of the main group's stay.[42] Asahara established himself in the main house of Banjawarn, and the others lived on the various other quarters of the property.[43] On arrival, Aum's senior chemist, Toyoda, quickly established a laboratory in the kitchen of an abandoned house on the ranch, about 130 metres from the main homestead.[44] The door to this lab was marked in Japanese 'Toyoda Laboratory',[45] and below it in English, 'Do Not Enter'.[46] In addition to the extensive scientific equipment the group had such as laptop computers, a spectrometer, beakers, Bunsen burners, and various digital apparatus, Aum also imported electrical equipment such as transformers, static converters, generators, coaxial cabling, batteries, tools, and protective equipment into the country through one of their companies Mahaposya Australia.[47] The chemicals used in this lab were purchased by the group through a wholesaler in Perth and were either driven back to the property by the members, or sent to the property addressed to Tusyoshi Maki.[48] The group purchased copious amounts of hydrochloric acid, ammonia solution, perchloric acid, nitric acid, chloroform, sulphuric acid, and potassium dichromate. The group also required Thioacetamide, which was unavailable from their original wholesaler. Maki flew from Perth to Melbourne and back in the same day, just to purchase the chemical worth A$190.[49]

With the establishment of the laboratory, the chemicals available, and the qualifications of the members present, Aum was capable of producing the toxic nerve gas sarin and mustard gases at Banjawarn.[50] The cult members that worked in the Toyoda laboratory manufactured the sarin nerve gas, and conducted the first trials of the chemical on 29 sheep on the property.[51] The amount of sarin produced by the group is unknown; however, only 5 millilitres would have been required to kill the 29 sheep.[52] The sarin produced is most likely to have been an impure form.[iii]

In conjunction with the production of and experimentation with sarin, the group attempted to excavate uranium ore from the deposit located at Vickers Well on the property.[53] In addition to the excavation equipment that the group had flown from Japan, including two ditch diggers that they had payed A$5000 each to get to Australia, the group hired a backhoe without an operator and purchased a grader from a nearby property.[54] The group strategically dug large test holes at particular points around the area and as they dug, acquired samples down to depths of between 12 and 14 feet. The Aum scientists on the property conducted their own assay of the samples they collected.[55] Aum had intended to export the uranium ore back to Japan.[56] During the covert stage of this operation, the period that the main group is on the property, the group lived together in close proximity, with every member interacting on some level with every other member, indicating the highest

[iii] In the subsequent Matsumoto and Tokyo attacks in 1994 and 1995, an impure form of sarin was also used.

level of interaction within the cell (specifically from a counter-terrorism point of view).[57] [iv]

On the 17th of September, just over a week after arriving in Australia, Asahara left for Japan on flight QF79 to Tokyo with Toyoda, Kido, Hori, Matsumoto, Niimi, Itonaga, Ami, Onaya, Shinohara, Tatsuta, Tanabe, Go, Hirose, Kakinuma, Shimizu, Maruhashi, Yamamoto, Muari, Togashi, Noda, and Inoue.[58] In the following days a majority of the remaining members left the property. Asahara and other members of the cult attempted to return to the newly established facility, but were denied visas by the Australian government.[59] The property was eventually sold for A$330 000 on October 4, 1994.[60]

Aum Shinrikyo: Relational Data

For the purpose this social network of analysis, the Aum Shinrikyo cell will be considered to have been fully operational and fully covert from the arrival of the main group to the Banjawarn property on September 9, 1993, and is considered to have ceased this activity on the departure of Asahara and his cohort on September 17, 1993. This is due to the fact that it was in this period that Aum conducted its most covert operations: the attempted extraction of uranium ore and the production of the nerve gas sarin. The size of this dataset is 21, and includes:

1. Kiyohide Hayakawa
2. Tsuyoshi Maki
3. Naoko Furusawa
4. Yoshihiro Inoue
5. Nobuki Ami
6. Masaharu Itonaga
7. Seiichi Endo
8. Yutaka Onaya
9. Yuki Kakinuma
10. Satoru Shinohara
11. Satoru Go
12. Hideaki Tatsuta
13. Wakashio Togashi
14. Tooru Toyoda
15. Tomomitsu Niimi
16. Naruhito Noda
17. Kenichi Hirose
18. Akira Hori
19. Shoko Asahara
20. Hideo Muari
21. Tomomasa Nakagawa

The adjacency matrix in table 1 represents the binary relationships between the members of the Banjawarn cell that were determined through the contextual background. Figure 1 is a sociogram of the Banjawarn cell, clearly demonstrating the binary relations of the individuals in the cell. Table 1 and figure 1 demonstrate that every member of the cell interacted with every other member during this period.

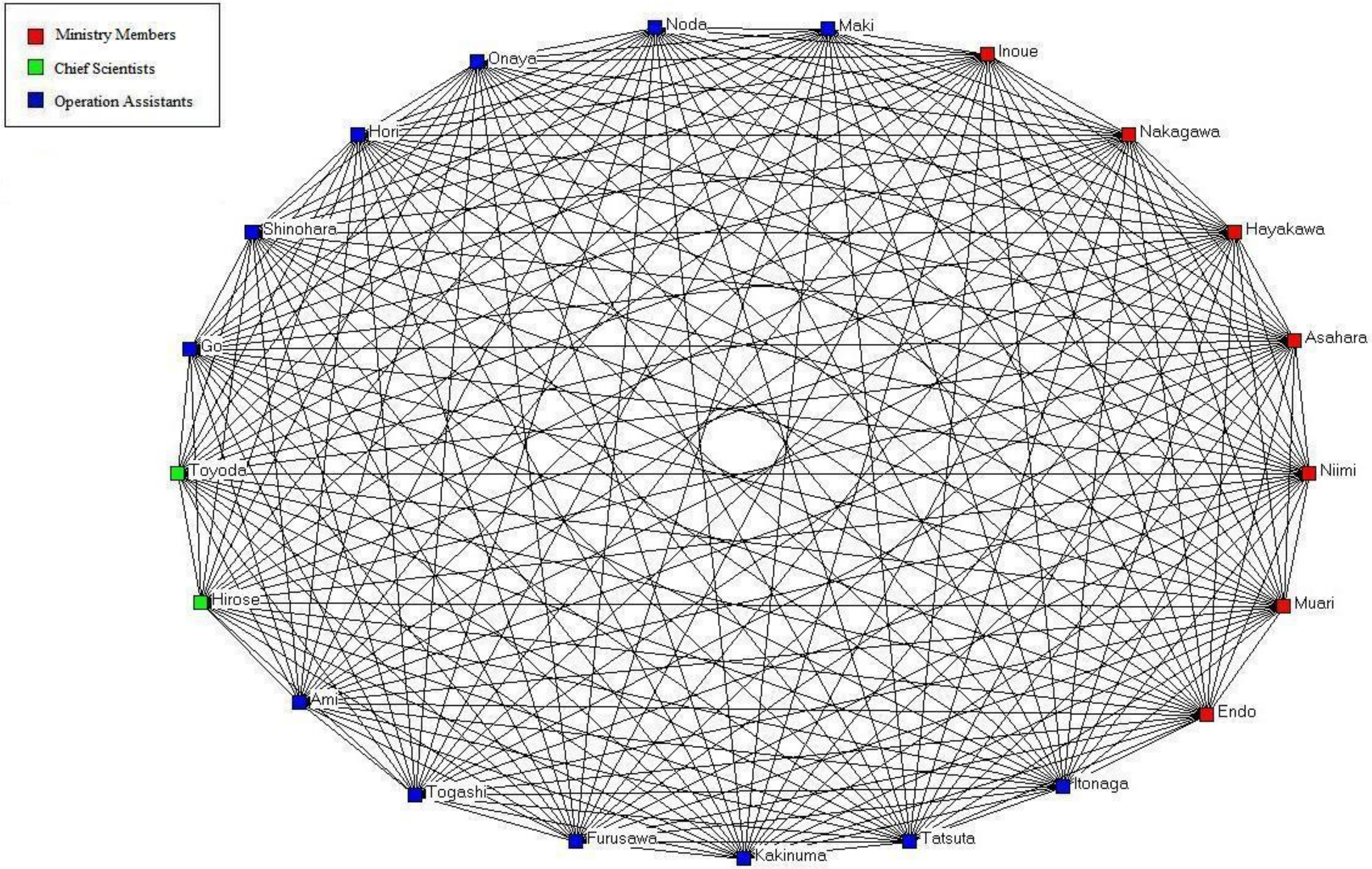
[iv] The other networks examined within the author's thesis used static weighted representation of dynamic relationships, however due to the circumstances of the operation of the Aum cell, the scoring of the different relationships was not possible, suffice to say that every individual interacted with every other individual within the network.

Table 1: Aum Shinrikyo Binary Relations

	HAYAKAWA	MAKI	FURUSAWA	INOUE	AMI	ITONAGA	ENDO	ONAYA	KAKINUMA	SHINOHARA	GO	TATSUTA	TOGASHI	TOYODA	NIIMI	NODA	HIROSE	HORI	ASAHARA	MUARI	NAKAGAWA
HAYAKAWA	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
MAKI	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
FURUSAWA	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
INOUE	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
AMI	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
ITONAGA	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
ENDO	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1
ONAYA	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1
KAKINUMA	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1
SHINOHARA	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1
GO	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1
TATSUTA	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1
TOGASHI	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1
TOYODA	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1
NIIMI	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1
NODA	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1
HIROSE	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1
HORI	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1
ASAHARA	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1
MUARI	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1
NAKAGAWA	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0

FIGURE 1: AUM SHINRIKYO GRAPH - BANJAWARN OPERATION

September 9, 1993 - September 17, 1993



Aum Shinrikyo: Network Criteria Analysis

Table 2: Network Structural Measures

	CELL SIZE	DENSITY	DEGREE OF CONNEXION	AV. COMMUNICATION SPEED
Score	21	100	20	100

Table 3: Centrality Scores (Standardised)

	ACTOR DEGREE CENTRALITY (Standardised)	BETWEENNESS (standardised)	CLOSENESS (standardised)
HAYAKAWA	100.00	0.00	100.00
MAKI	100.00	0.00	100.00
FURUSAWA	100.00	0.00	100.00
INOUE	100.00	0.00	100.00
AMI	100.00	0.00	100.00
ITONAGA	100.00	0.00	100.00
ENDO	100.00	0.00	100.00
ONAYA	100.00	0.00	100.00
KAKINUMA	100.00	0.00	100.00
SHINOHARA	100.00	0.00	100.00
GO	100.00	0.00	100.00
TATSUTA	100.00	0.00	100.00
TOGASHI	100.00	0.00	100.00
TOYODA	100.00	0.00	100.00
NIIMI	100.00	0.00	100.00
NODA	100.00	0.00	100.00
HIROSE	100.00	0.00	100.00
HORI	100.00	0.00	100.00
ASAHARA	100.00	0.00	100.00
MUARI	100.00	0.00	100.00
NAKAGAWA	100.00	0.00	100.00

The size of the Aum Shinrikyo cell was 21, a significantly large cell, with individuals in the network ranging from the leader of the cult, to ministers, to scientists, and to lower ranked members. Most significant was that fact that the group operated with 100% density, entirely contrary to a traditional 'covert' formations adopted by most terrorist cells.[v] A completely dense cell entails maximum possible efficiency, and consequentially the minimum possible covertness available through structural measures. Operating with a lack of covertness generally indicates that a cell has a higher chance of being compromised.

The degree of connexion score of 20 merely confirms that each member of the network interacted with every other member of the network during the 'covert' period of the operation. The average communication speed was 100, again illustrating the efficiency of the cell. The cell countered the low covertness of their network through the remoteness of their base of operations (Banjawarn), by ordering all non-members from the property, and by operating in a nation whose law enforcement and intelligence agencies knew very little or nothing at all of the group's activities in Japan and Russia. This allowed Aum to operate without a focus on covertness and still

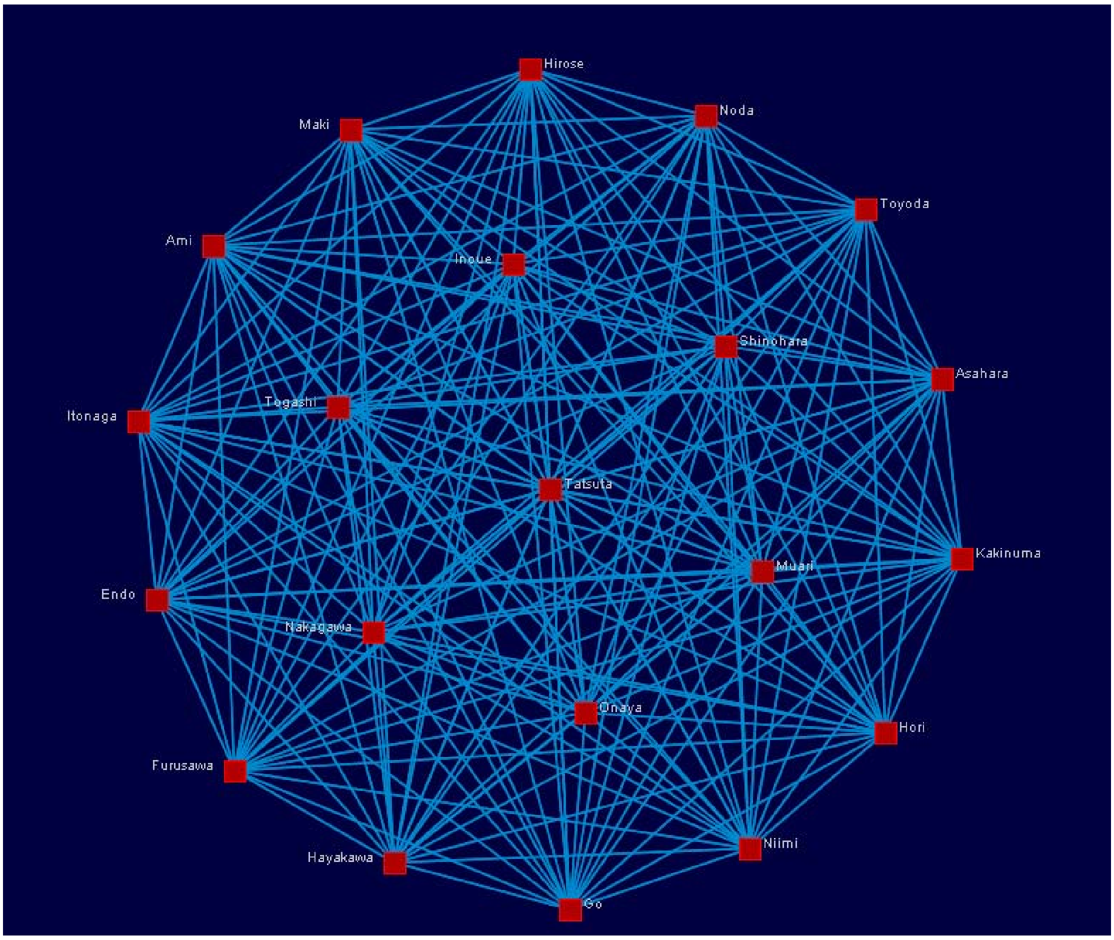
[v] Such as the Croatian Revolutionary Brotherhood, Lashkar-e-Taiba, and Jemaah Islamiyah cells examined in the author's PhD project.

undertake its mission objectives, this is best evidenced by firstly, the success of this stage of their operation, and secondly by the fact that this was still achieved following charges and convictions against some of these members for carrying dangerous goods on an aircraft on arrival in Australia.[61]

Due to the all-channel formation of the network (every node interacted with every other node), each member of the network had an equal degree of centrality, indicating that each individual had an equal amount of activity within the network. Likewise, each individual had identical closeness scores of 100%, signifying each node had access to each other node. Once again, each member received the same value for betweenness, this value being zero, and indicating that no individual had control over the flow of data within the network, due to each individual's maximum closeness.

From the social network analysis measures applied above, it is impossible to determine the most important node or nodes within this network, and it is impossible to distinguish the relative importance of each individual to the network.

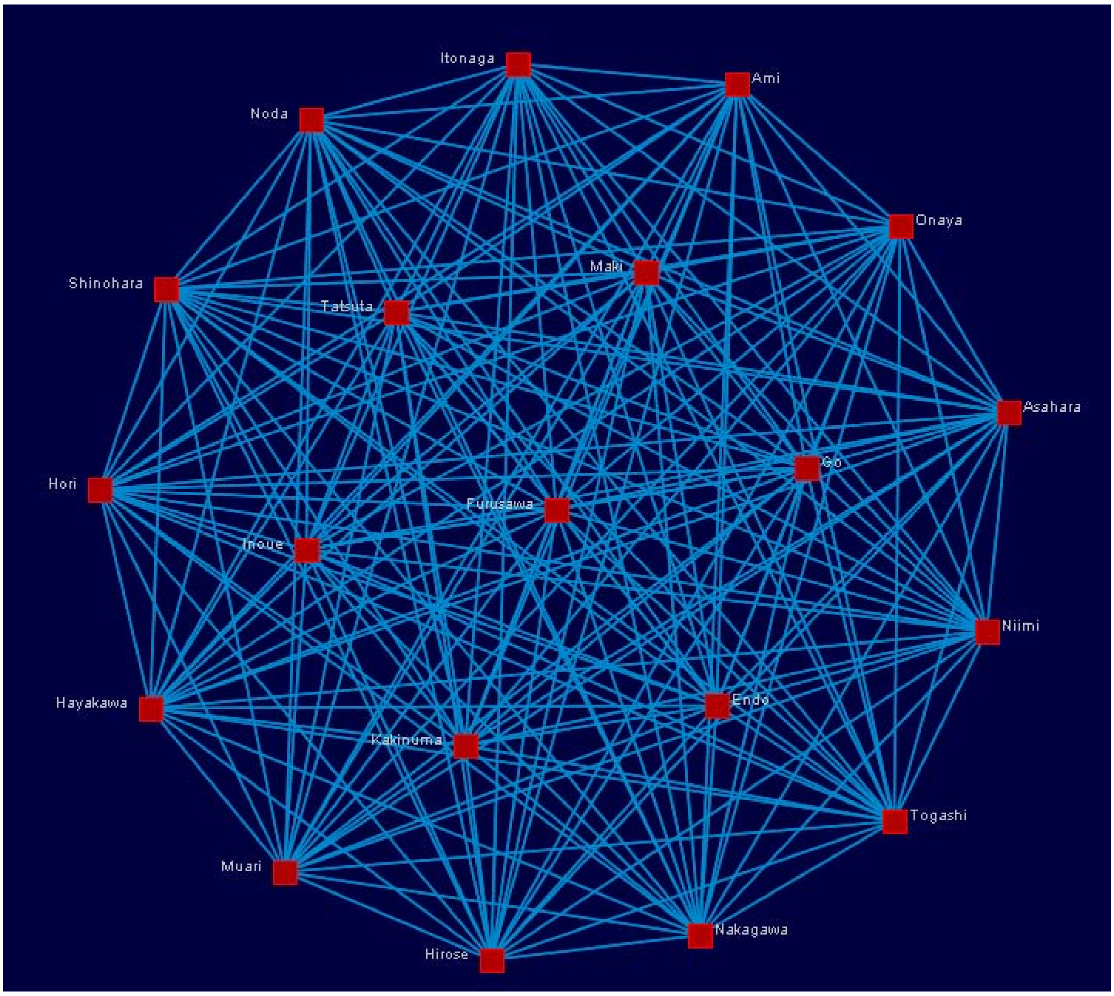
Figure 2: Original Sociogram



Aum Shinrikyo: Destabilisation Techniques

Because it is not possible to identify the nodes of critical structural importance through sociometric measures, it is not possible to use the traditional measures to attempt to destabilise the cell. For example, figure 2 shows the original Aum network in figure 1 (through the ORA program). Because each of the nodes in the network are of equal importance and centrality, it does not matter which node is targeted (the removal of each will have the same effect). Figure 3 shows the cell following the removal of Toyoda from the network. Following this removal, the formation remains the same (all-channel), the communication speed remains the same (1.00), and all of the centrality scores remain the same. The only effect the removal of Toyoda has had on the structural measures is the size and degree of connexion (20 and 19). While the Aum cell exhibits an extreme lack of covertness in the structural formation, the 100% density and the resulting effectiveness of the cell make it theoretically extremely difficult to destabilise.

Figure 3: Toyoda Removal



As has been demonstrated, there are no nodes that are of critical structural importance to the network, which makes it impossible to significantly reduce the information and communication flow within the network, and likewise to reduce the decision making capability and the effectiveness of the network. This density also makes it impossible to separate critical sections of the network through the removal of a small amount of nodes. Because the ranking leaders within the network are clearly and definitively identifiable through the contextual background, this allows attempts at destabilisation through targeting the Aum ministry members aiming to reduce the decision making capacity and the effectiveness of the network. The members to be targeted are the ministry members and the supreme leader:

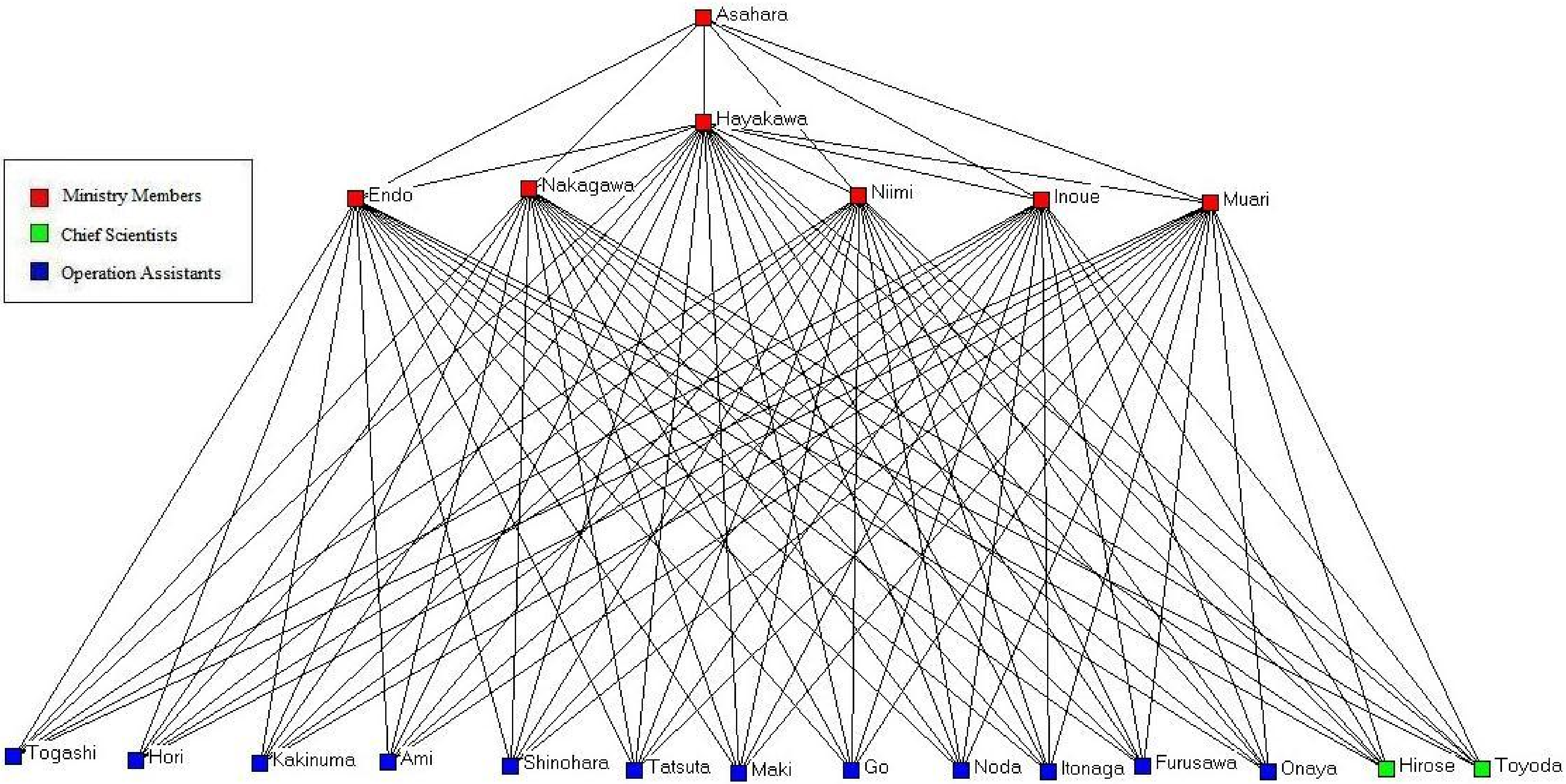
Hayakawa, Endo, Nakagawa, Niimi, Inoue, Muari, and Asahara. This hierarchical method merely seeks to increase the effectiveness of the measures by attempting to reduce the decision making capacity of the network.

Figure 4 shows a hierarchical model of the Aum network represented in figure 1. This model was determined by the ranks of the individuals, and who their orders were given to. This is basically a visual representation of the hierarchical structure synthesised from a more detailed contextual background. This model clearly illustrates the command structure of the Aum network, and allows destabilisation techniques to be aimed at this command structure. It must be noted that this model is not synthesised from social network analysis, and is not a sociograph, but is merely a graph used to visually demonstrate the effectiveness of targeting the highly ranked nodes of the network to disrupt the decision making capacity. This measure attempts to remove all command members from the network, and leave the remaining cell members without any orders or hierarchy in an attempt to significantly reduce the decision making capacity of the cell. The high ranking individuals within the network were signified by the red nodes in figure 1, however, figure 4 more clearly demonstrates the hierarchical relations between the leaders and followers of the network. The hierarchical model shows Asahara at the top of the network as the 'supreme leader', followed by Hayakawa as his second in charge. Next are the ministry members who received their orders from both Asahara and Hayakawa. Hayakawa, Endo, Nakagawa, Niimi, Inoue, and Muari, all gave and passed down orders to the rest of the network.

Destabilisation measures that are employed against all-channel networks cannot aim at reducing the information and communication flow, the effectiveness of the network, or the isolation of components of the network. The destabilisation method proposed requires the conclusive identification of *every* leader and their rank within the network through the contextual background, as was possible in the case of the Aum Banjawarn cell. This method may also require multiple steps to significantly reduce the decision making capacity of the cell, seven in the case of Aum. Even after the complete removal of the cell hierarchy, an all-channel network of 14 nodes still remains.

Despite these issues, all-channel networks operate with minimum covertness and due to their high density, the exposure of one node by counter-terrorism authorities should very quickly lead to the exposure of all of the other nodes within the network. This is the case with the Banjawarn cell. In practice, if counter terrorism authorities targeted and exposed a single individual within the network, this would have potentially given them links to twenty other individuals and the Banjawarn property, and hence the exposure of every other node within the network.

FIGURE 4: HIERARCHICAL MODEL OF AUM SHINRIKYO - BANJAWARN OPERATION
September 9, 1993 - September 17, 1993



Applications

To sum, the network formation and modus operandi adopted by Aum Shinrikyo was vastly different from traditional terrorist cells, which are covert, dispersed, and dynamic. Despite the extreme effectiveness of the Aum cell and its apparent resistance to traditional destabilisation methods, the capture of one node within the network would have the potential to lead counter-terrorism authorities to every node in the network due to the total lack of structural covertness. Thus, the best destabilisation method for an all-channel network is to target the highest ranking nodes in the network that have been identified through the contextual background, and remove these nodes from the network to increase the effectiveness of such techniques. This measure aims to reduce the decision making capacity of the cell, discover and compromise the links to other nodes in the network (due to the network's low covertness) and consequentially neutralise the remaining nodes. As we have seen, the removal of any number of nodes from an all-channel network leaves identical centrality and communication scores. In short, to destabilise an all-channel network requires the removal of a significantly high number of (preferably high ranking) nodes. This neutralisation is made infinitely easier through the speed at which the rest of the network can be identified. Despite generating a strategy to destabilise this all-channel network, the method failed to identify any critical nodes within the network, at which counter-terrorism operations should be aimed, this shows some weakness of the utility of social network analysis against cells that focus on maximum efficiency.[vi] However, the methodology provided significant levels of insight and understanding into the cell, its interaction and communication, its modus operandi, and allowed for adequate destabilisation techniques.

This paper conducted a social network analysis of the Aum Shinrikyo terrorist cell that operated in Western Australia in 1993. This analysis has provided substantive and in-depth analysis of a terrorist cell that has operated in Australia. Furthermore, this analysis has provided a richer and deeper understanding and insight into how the cell operated, communicated, and has provided measures to destabilise this cell. The destabilisation techniques that were proposed in this paper are applicable to any terrorist or covert organisation operating in all-channel networks, or all-channel clusters within larger networks.

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