

Chapter 5

Social network analysis

5.0 Introduction

This chapter presents a brief overview of social network analysis (SNA). Social network analysis is a method for studying social systems, and is used by mathematicians, sociolinguists, and computer programmers among others. The topic of SNA was introduced in Chapter 2, but is discussed more thoroughly in this chapter. After looking at social networks in general, the Nepali network in Chiang Mai is examined. Social network analysis is used in this chapter to explore the possibility of introducing a small language development program for Nepali children.

Introducing innovation is just one of many ways that SNA is employed for sociolinguistic research. Some sociolinguistic studies have used SNA to indicate language maintenance, yet other studies have had different results using similar data. This chapter concludes with an evaluation of SNA in sociolinguistic research.

5.1 Social network analysis

Social network analysis was initiated by researchers in the 1800s, although it was not until the 1930s that a scientist, Jacob Moreno, created a 'sociogram'. A sociogram is a visual representation of a social network (Scott 1991:10). See Figure 11 for an example. The nodes in a sociogram² are the points, and the links are represented as lines between the points (Rueck 2005a:2).

² The sociogram in Figure 11 was drawn using software by Borgatti, S.P., Everett, M.G. and Freeman, L.C. 2002. Ucinet for Windows: Software for Social Network Analysis

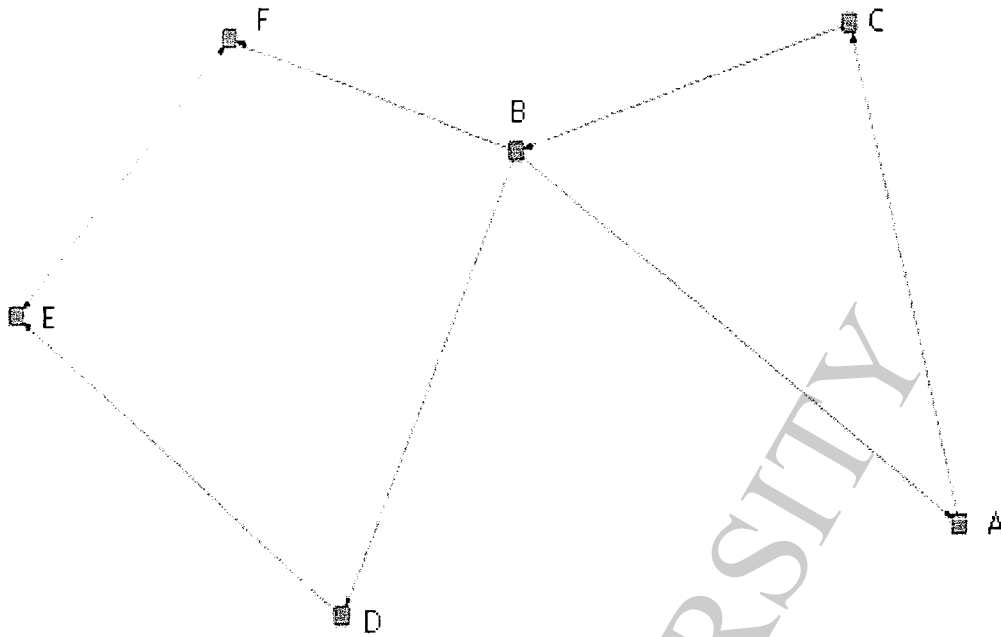


Figure 11. Example sociogram

As SNA became more advanced, sociograms grew more complex. Currently, they are referred to as network maps. A network map is a convenient way to understand the relationships between the actors. Also, a map illustrates the nature of a whole social network structure, with multiple relationships being studied.

SNA has been used to study everything from the spread of AIDS in small villages to trade relationships between nations. What makes social network analysis unique is that “it is the links between the subjects which are analyzed, not the attributes of the subjects themselves. It is the study of who gives what to whom” (Rueck 2005b:2).

Therefore SNA can appear simplistic or incredibly complex. According to Hanneman, “Network data are defined by actors (nodes) and by relations (links). The nodes or actors part of network data would seem to be pretty straight forward” (Hanneman 2005:3). Yet tracing all the links between nodes can be complicated. It is difficult to know where a network begins or ends, making boundaries necessary. For example:

A social network may be defined relationally by starting from one actor and tracing his relationships, and then tracing the relationships of everyone he relates to, and so on. A network to be studied can also be defined as all those actors who share a certain attribute. For example, one could study the network of relationships amongst all of the women who live in a certain village. Their two common

attributes would be residing in the same village and being female. The boundary of a network could also be the actors' participation in some activity (Rueck 2005b:2).

Even with well-defined boundaries, a network map can be difficult to interpret. Social network software is often used to draw sophisticated network maps. For example, see Figure 12³.

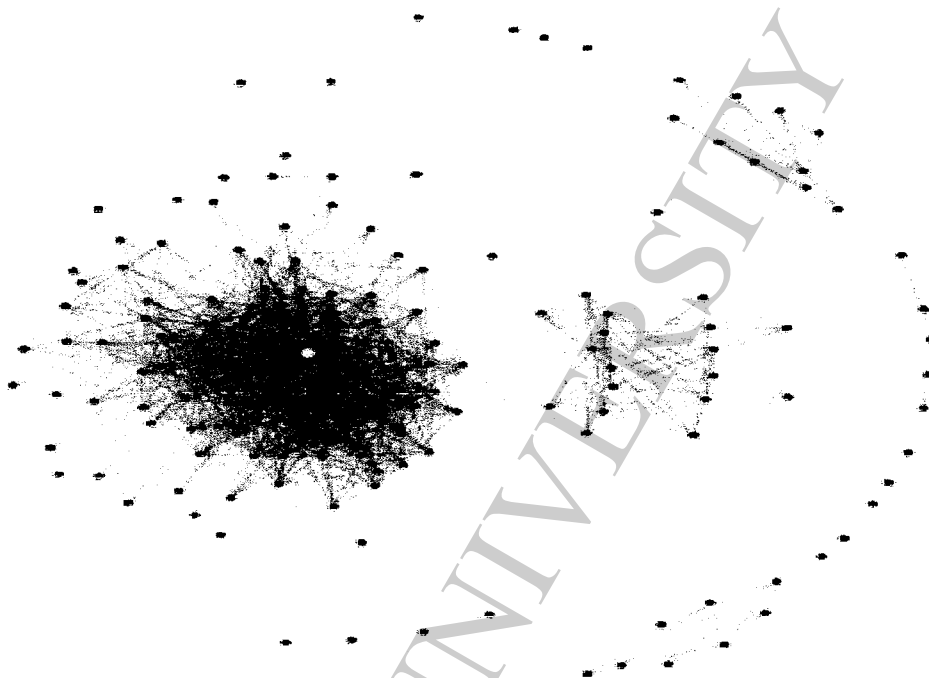


Figure 12. An example of a complex social network diagram

5.2 Other sociolinguistic studies in SNA

Sociolinguists have been utilizing social network analysis since the 1970s. Social network was first used in sociolinguistics as a quantitative tool, by Milroy and Milroy (1978). They conducted a Belfast research project, in the inner city, as a method for analyzing language change in an urban dialect. Their research was initiated because it was recognized that “stigmatized and low-status forms of language tend to persist despite strong pressure from ‘legitimized’ norms. Social network analysis thus provides a methodology for studying the interaction between patterns of maintenance and patterns of change” (Milroy and Milroy 1997:59-60). Their research utilized SNA by choosing to view sociolinguistic data based on the

³ (http://en.wikipedia.org/wiki/Social_network)

concepts of multiplexity and density. They examined the network strength of individual speakers living in Belfast. The results of their research showed that a close and dense network seemed to indicate language maintenance, even when social pressures discourage a group from using a perceived “low-class” variety of the language.

A more finely-tuned account of the notion of solidarity is provided by Lesley Milroy (1997). By tracing observable interactive links between people, the sociolinguist is able to explore, with greater accuracy than by the use of blunt sociological categories like social class, the way factors such as social cohesion in such communities operate to create, reinforce, and alter individuals’ speech patterns. The result provides a persuasive explanation of why and how nonstandard speech forms persist in such environments, essentially because of the strength of individuals’ identification with such communities, and the coerciveness of local public opinion which sees the use of nonlocal forms as some kind of disloyalty to the social group. We see here the strength of an alternative value-system, which has a higher estimation for the feeling of community supportiveness than for membership of the mainstream society (1997:102).

The following section will discuss two case studies from Malaysia and compare them with the previous work Milroy and Milroy did on close-knit networks and language maintenance. Lesley Milroy (1987), following Blom and Gumperz (1972), indicated that a close social network is an important factor for language maintenance, in that people are able to unite together in a group. The corollary is that an open network would enable language shift (Govindasamy and Nambiar 2003).

More recent research, however, has questioned the effectiveness of SNA to indicate language shift or language maintenance. Linguists Govindasamy and Nambiar (2003) attempted to discover to what extent concepts from the West, like social network analysis, would apply to immigrant groups like the Malayalees in Malaysia. Their study shows that though they found a dense network functioning in the Malayalee community, it did not lead to language maintenance. (This study was also briefly discussed in chapter 2 of this thesis).

Govindasamy and Nambiar looked carefully at the network of Malayalees in Malaysia. They came to the conclusion that “Malayalees are still interacting socially with more of their own kind than with members of other ethnic groups but the language of interaction is not necessarily Malayalam; it is increasingly shifting to English” (2003:40).

For the Malayalee immigrants, the economic pressures weighed heavier than the norm-enforcement pressure of a dense network. The Malayalees responded to opportunities which prioritized education, as well as the economic opportunities that arose when they had knowledge of English. In any immigrant community, the open/closed network system is being greatly subjected to change from such opportunities. "Hence, the applicability of the network system as a norm-enforcement agency, whether linguistic or otherwise, appears less sustainable, given the time and space" (Govindasamy and Nambiar 2003:43).

Another immigrant community was researched in 1998, using social network analysis. The Sindhi people living in Malaysia have experienced language shift. Yet, research indicates that the Sindhis do not need their ethnic language to keep their culture alive. Malaysian Sindhis do not appear to need a language-based identity.

Their identity is based on their religion, customs and culture, kinship and social ties, dense and multiplex networks, and an awareness of a persecuted past. The salience of language and ethnicity are not dependent on each other for the Sindhis of Malaysia (Khemlani-David 1998:67).

Like the Malayalees, the Sindhis also have a dense and multiplex network. Although both English and Malay have, to a large extent, replaced Sindhi, the community is still cohesive (Khemlani-David 1998:73).

Sindhis actively use such ethnic networks both within and outside the country when looking for spouses or jobs or for business generally. If ethnic identity is, as cited by Fishman (1989:10), 'the sensing and expressing of links to one's own kind'...then the Sindhis, as a result their constant and extensive contact with each other, intergroup social dependency relationships, and perceived obligations toward one's own kind, are indeed ethnically bound (Khemlani-David 1998:72).

The Sindhi people reportedly have no fear of their cultural identity being lost despite their switch to English and Malay. Khemlani-David lists many instances in which she noted that the Sindhis are maintaining their religious customs, culture, and interactions, without the need of their ethnic language.

5.3 The Nepali network in Chiang Mai

Any social group or ethnic group can be examined using social network analysis. In this section, the Nepali community in Chiang Mai is explored. Hanneman claims, “The populations that network analysts study are remarkably diverse. At one extreme, they might consist of symbols in texts or sounds in verbalizations; at the other extreme, nations in the world system of states might constitute the population of nodes” (2005:5). Therefore, it follows that a network can be made up of individuals or groups. For example, neighborhoods or clubs are social entities which can be viewed as nodes on a network map. They form links with other neighborhoods or clubs. When network analysts look at the people within these linked neighborhoods, they think of those individuals as being embedded in networks that are embedded in networks that are embedded in networks. Networkers describe such structures as “multi-modal” (Hanneman 2005:6).

For the purpose of this chapter, the Nepali community is explored at the group level. A multi-modal examination is beyond the scope of this data. However, there are five Nepali social groups that will be examined, and each group will be represented by a node on the network map (See Figure 13).

The individuals in the Nepali community of Chiang Mai make a dense and multiplex network. “You are said to be involved in a dense network if the people you know and interact with also know and interact with one another. People who go to school together, marry each others’ siblings, and work and play together participate in dense multiplex networks” (Wardaugh 2006:129). In this study I noticed many Nepali participants who worked with their family members or married Nepalis who worked in shops nearby. Interestingly, the majority of the participants all attended the same Hindu temple on Nepali holidays, even if they themselves were not Hindu.

The social network data for this chapter was collected through informal interviews, observations and responses to the Screening Questionnaire. (See chapter 3 for more details about the methodology. The Screening Questionnaire is in Appendix 2).

Network analysis focuses on the relations among actors, and not individual actors and their attributes. This means that the actors are usually not sampled independently, as in many other kinds of studies (most typically, surveys) (Hanneman 2005:4). Therefore the data for SNA in this study was not culled from the Sociolinguistic Questionnaire (SLQ), but through other means which identified the links between various Nepali social groups or communities.

5.4 Language vitality and SNA among Nepalis

When gathering data for this thesis, there were several occasions when I was told that the Nepali community wanted to build a study program for Nepali children in Chiang Mai, which could meet informally after Thai school, and on holidays. Many Nepalis interviewed expressed the desire to teach their children the Nepali language before the children stop speaking it and language shift, for that community, occurs.

Social network analysis can be employed to introduce innovations into communities seeking development. Therefore this section explores the optimal avenue to promote a Nepali study program by using social network analysis. In conducting this research, I sought to answer the following research question:

If a language development/preservation program were introduced to encourage language vitality among the Nepalis of Chiang Mai, where would one introduce it for maximum impact?

Initially, the Nepali network first needs to be assessed to determine if it is strong enough for innovation to be dispersed effectively to its members. Krebs and Holley, social network innovation experts, describe five patterns that are observed in all effective networks:

1. Birds of a feather flock together: nodes link together because of common attributes, goals or governance.
2. At the same time, diversity is important. Though clusters form around common attributes and goals, vibrant networks maintain connections to diverse nodes and clusters.
3. Robust networks have several paths between any two nodes
4. Some nodes are more prominent than others.
5. Most nodes in the network are connected by an indirect link in the network. Yet, the average path length in the network tends to be short. There are very few long paths in the network that lead to delay and distortion of information flow and knowledge exchange (2009:4).

The Nepali network map (Figure 13) is a tool to demonstrate that there are ties between the social groups, and where to create new links if possible.

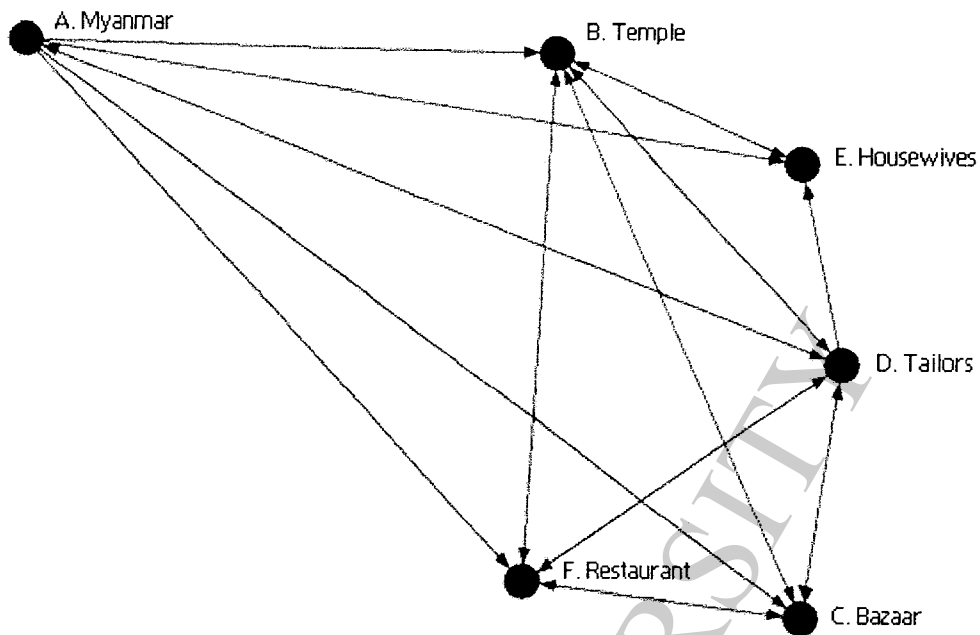


Figure 13. Network map of Nepali relationships

Figure 13⁴ demonstrates the links between six Nepali groups. The six nodes represent the main social groups where Nepalis communicate with each other in Chiang Mai, as well as their sending community in Myanmar.

5.4.1 The nodes in the network map

These six social groups were identified through observation, interviews and the Screening Questionnaire (Appendix 1). Each social group will be described below:

Node A, “Nepalis in Myanmar” was selected because all of the participants (or their parents) in this research came from Myanmar. Although some Nepalis return to Myanmar to visit, they can only afford to go back once or twice.

Node B, “Hindu temple” (in Chiang Mai) was chosen because it is reportedly where Nepalis go to meet other Nepalis, celebrate rites of passage, and partake in Nepali holidays.

Node C, “Night bazaar” was identified because many Nepali speakers work there. It was also mentioned as a location where Nepalis go to meet others.

⁴ Drawn from software by Borgatti, S.P., Everett, M.G. and Freeman, L.C. 2002. Ucinet for Windows ©: Software for Social Network Analysis.

Node D, “Tailors” was selected because Nepalis work in many of Chiang Mai’s tailor shops. The Nepali tailors all seem to know each other.

Node E, “Housewives” was chosen as a separate group because the women are usually the wives of tailors, and can afford to stay at home to care for their children.

Node F, “Nepali restaurant” was identified because it is a location where single men get authentic Nepali food. These men meet at the Nepali restaurant because they are unmarried and therefore have no wives to cook for them. Additionally, the Nepali restaurant is a place where many Nepalis reported that they like to meet their friends. I noted that all the customers and staff were speaking Nepali each time I visited the location, which is Chiang Mai’s only Nepali restaurant.

The nodes represent social groups I encountered while conducting this research. They are not separate entities. For example, a Nepali tailor can be a member of the Hindu temple. Likewise, a worker at the Night bazaar can be a regular customer at the Nepali restaurant.

5.4.2 The links in the network map

The links (Figure 13) have arrows indicating the direction in which communication flows. These links between each node can be categorized as an exchange or movement of goods or an exchange or movement of communication. For example, intermarriage would be a material link while passing along news would be an information link (Rueck 2005a:2). In the case of the Nepali network, the links are communication links, whereby innovation-related information can be introduced and spread. Hanneman claims, “Informational things, to the systems theorist, are ‘non-conserved’ in the sense that they can be in more than one place at the same time. If I know something and share it with you, we both now know it. In a sense, the commonality that is shared by the exchange of information may also be said to establish a tie (link) between nodes” (2005:11).

In the Nepali network map, information flows along the links, in the direction of the arrows. If there is an arrow at each end of a link, that indicates “transitivity”, or information that goes back and forth along a link. For example, the link from node A to node B has an arrow at just one end. It indicates that Nepalis who move to Chiang Mai from Myanmar often visit the Hindu temple. However, they rarely return to Myanmar. Therefore the information flows in one direction along that link. On the other hand, the link from node B to node E has arrows on each end. Nepali housewives often go to the temple in the evening to pray and visit friends. They share information at the temple, giving and exchanging news.

The links on the Nepali network map indicate the direction in which information flows, based on observation and interviews conducted in this research period.

In the Nepali network map, there are strong ties and weak ties. According to Krebs and Holley, “long paths in the network lead to delay and distortion of information flow and knowledge exchange” (2009:4). The ties (links) to the node representing the Nepali group in Myanmar are the longest, indicating the physical distance from all the other groups in Chiang Mai. Therefore, that tie is the weakest.

5.4.3 Binary data

Binary data is so widely used in network analysis that it is not unusual to see data that are measured as a “higher” level transformed into binary scores before analysis proceeds. To do this, one simply selects some “cut point” and re-scores cases as below the cut-point (zero) or above it (one) (Hanneman 2005:12).

Another way to examine the data is seen in Table 23:

Table 23. Binary grid of Nepali network paths

	Nepalis in Myanmar	Hindu Temple	Night Bazaar	Tailors	House-wives	Nepali Restaurant	Total 'Out' paths
A. Nepalis in Myanmar	-	1	1	1	1	1	5
B. Hindu Temple	0	-	1	1	1	1	4
C. Night Bazaar	0	1	-	1	0	1	3
D. Tailors	1	1	1	-	1	1	5
E. Housewives	0	1	0	0	-	0	1
F. Nepali Restaurant	0	1	1	1	0	-	3
Total 'In' Paths	1	5	4	4	3	4	

For this research, the information is reduced to binary data by giving each direction for every link a score of one. If there were no links going to a node, it was assigned a score of zero, indicating no information coming to the node along that link. If there were no links indicating information going from a node, it was assigned a score of zero. Thus each link has two possible paths, one with information coming in, and the other with information going out. See Table 23.

5.4.4 In-degree and out-degree centrality

An important part of using SNA is to quantitatively look at the results of the data. One approach is to measure the degree of in and out centrality for each person or node in the network. In his book on strategic intelligence, Liebowitz explains, “Individual network measures include various types of centrality. For example, in-degree centrality refers to the number of incoming ties a person has for a given

relationship. Out-degree centrality is the number of outgoing ties a person has for a given relationship” (2006:82).

In an SNA case study of a computer-aided language learning community, Sears and Jacko discuss centrality. “The in and out degree centrality was measured by counting the number of interaction partners per each individual in the form of discussion threads. For example, if an individual posts a message to three other actors then his or her out-degree centrality is three; whereas if an individual receives posts from five other actors then his or her in-degree is five” (2007:612).

Table 24. Degree centrality for each Nepali group

	Out- degree centrality	In- degree centrality	Total degree centrality for each node
Node A. Nepalis in Myanmar	5	1	6
Node B. Hindu Temple	4	5	9
Node C. Night Bazaar	3	4	7
Node D. Tailors	5	4	9
Node E. Housewives	1	3	4
Node F. Nepali Restaurant	3	4	7

In this research, the nodes with the combination of the highest in-degree and out-degree centrality have the highest score. The data in Table 24 shows that the Hindu temple (Node B) and the Nepali tailors (Node D) have the highest degree centrality overall.

5.4.5 Robust networks and *k*-cores

Networks with high overall density are likely to be robust, egalitarian, and able to respond quickly and effectively to new stimuli. A high number of connections within the network mean that most actors will have more than one path by which to communicate efficiently with most other actors (Rueck 2005a:3). Conversely, “networks that have few or weak connections, or where some actors are connected only by pathways of great length may display low solidarity, a tendency to fall apart, slow response to stimuli, and the like” (Hanneman 2001:35).

The Nepali network has many connections. However, within that network, there may be “nested sub-groupings of increasing density” (Rueck 2005b:4). Identifying a *k*-core is one way of determining dense areas in a network map. “A *k*-core is a maximal sub-graph in which each point is adjacent to at least *k* other points: all the points within the *k*-core have a degree greater than or equal to *k* with respect to the rest of the *k*-core (not the entire component)” (Scott 1991:113). Therefore, a 3-core contains actors with a tie to 3 or more actors in the sub-group. Figure 14 shows a 3-

core, comprised of nodes ABCDEF. Within the 3-core, Figure 14 details a 4-core (inside the dotted line) comprised of ABCDF.

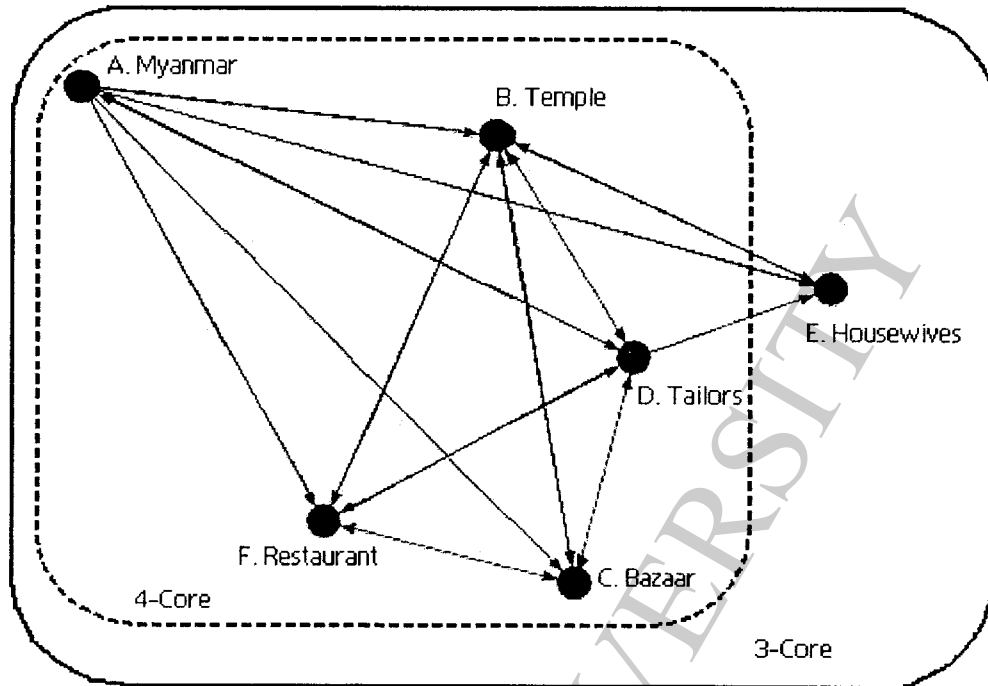


Figure 14. K-core in the Nepali network

The density of the 4-core in Figure 14 indicates that innovation information may flow more efficiently within that nested group.

5.4.6 Centrality

Innovations will flow through a low-density network slowly, if at all (Rueck 2005a:3). The Nepali network has many ties and consequently has high density. But which node is the most influential? One must look for centrality. Hanneman describes several different types of centrality, or ways of conceptualizing and measuring an actor's centrality. First, and most simple, is "degree centrality". An actor with a higher degree of centrality has direct connections to more other actors. Thus, she has more ways to receive things and more ways to distribute them than other actors (2001:63). In Figure 13, A, B, and D have the highest degree of centrality.

The direction of the arrows in a social network diagram is important. If there are arrows at both ends of a line, it indicates reciprocity. The flow of information can travel in either direction along that line (e.g. nodes B and E in Fig. 14). When many arrows are coming into a node, that node is called a "sink". Sinks are considered prestigious. When many lines are going out from a node, that node is referred to as a

“source”. Sources are thought to be influential. In Figure 14, node B is a sink, and node A is a source. Actors who are high in both sending and receiving information are likely to be the facilitators in the system (Hanneman 2001:43-44).

5.4.7 The network weaver

After identifying the nodes with the most centrality, an actor must be identified who can coordinate the diffusion of information. “Influencing a small number of well-connected nodes often results in better outcomes than trying to access the top person or calling on random players in the policy network” (Krebs and Holley 2009:3).

The Nepali community in Chiang Mai wants to begin a study program for Nepali children, focusing on Nepali language and culture. However, at the time of this research, no action has been taken. More leadership may be necessary. Krebs and Holley claim that,

Without active leaders who take responsibility for building a network, spontaneous connections between groups emerge very slowly, or not at all. We call this active leader a network weaver. Instead of allowing these fragments to drift in the hope of making a lucky connection, network weavers actively create new interactions between them (2009:6).

In the Nepali network, one can see that the nodes with the most centrality are A (Myanmar), B (temple), and D (tailors). These three nodes are also part of the 4-core shown in Figure 14. However, node A is connected through weak ties, because of its distance from the rest of the nodes. Therefore a network weaver should be an enthusiastic person from node B (the Hindu temple) or node D (one of the Nepali tailors). In Table 24, the Hindu temple had a score of 9 paths total. The tailors also had a score of 9 paths. The network weaver, therefore, may be most effective if he is a tailor, or comes from the temple.

A Nepali network weaver could promote the idea of the Nepali study program, as well as encourage the less connected nodes to participate in meetings and fundraising. The Nepali housewives would be a node with which the network weaver should strengthen ties, as they are some of the people who are highly interested in their children’s education. However, at this point, they make up the most isolated node.

5.4.8 Linking to periphery networks

Finally, it is crucial to link the whole network with other “periphery” networks, since new ideas are often encountered beyond the local community. According to Krebs and Holley, “A successful formula for creating ties for innovation is to find other groups that are both similar and different than your own. Similarity helps build trust, while diversity introduces new ideas and perspectives” (2009:12). An example of core/periphery networks is in Figure 15 (Krebs and Holley 2009:16). The white nodes are the core, and the black nodes are the periphery.

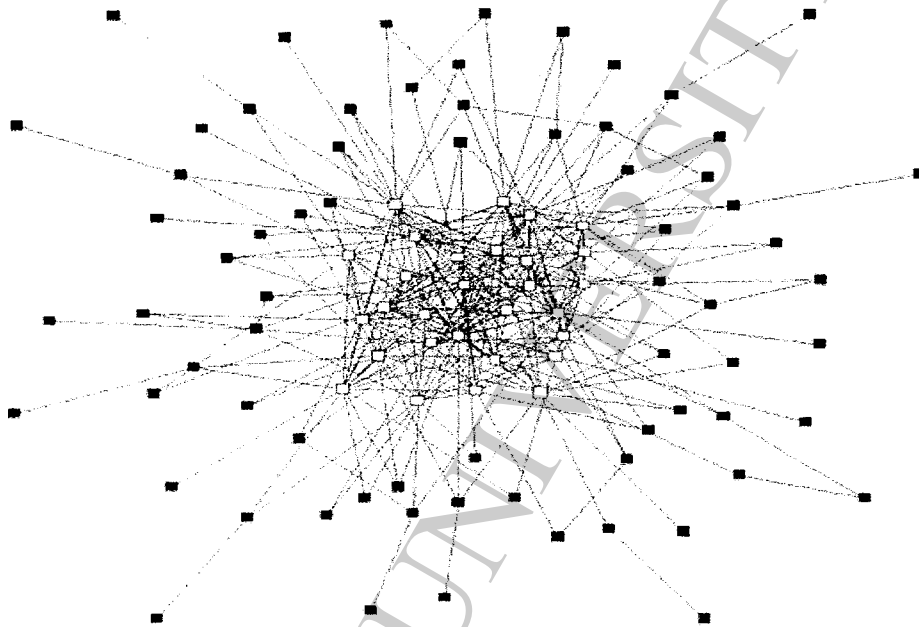


Figure 15. Core/periphery network

In interviews, several tailors mentioned large Nepali communities in Bangkok and Phuket. There are smaller groups scattered throughout the North and South of Thailand. If the Nepali network in Chiang Mai had strong ties to these other periphery communities, they could share ideas and resources for language maintenance.

5.5 Evaluation of SNA in sociolinguistic research

Social network analysis is a useful tool for the sociolinguist. However, it should not be too widely applied as a tool for predicting language preservation. SNA may suggest certain results for one ethnic group, and other results for a similar group. For example, the Milroys' research led them to believe that if SNA could identify dense and multiplex networks, it would find that those networks would be

preserving their ethnic language. However, as was demonstrated in the previous section, “Patterns of interaction not only are dependent on the activities within the community but are also subject to the opportunities and pressures of its external environment” (Govindasamy and Nambiar 2003:40). The research on Malayalees indicated that the economic pressures faced by the migrant communities led them to language shift despite a close network.

The benefit of social network analysis can be the identification of dense networks, which are indicators of ethnic solidarity. According to Omar, a linguist who researched Malaysians shifting to the English language in Kuala Lumpur, social networks (and not the ethnic language) are essential to maintain the cultural heritage and consequently the ethnicity of a community (1991:98).

Ethnic solidarity can exist even where the ethnic language is not spoken, as was seen with the Sindhis in Malaysia. Khemlani-David found that although English was spoken, it was used in a way that only a cultural insider would understand. Also, the Sindhis kept many key cultural terms from the Sindhi language. Khemlani-David asks, “Does the erosion and displacement of an ethnic language inevitably mean the loss of the ethnic culture and cultural norms? The full significance of the spoken discourse, albeit in English, will only be understood by an ethnic member” (Khemlani-David 1998:73).

The diffusion of innovation is an area where SNA has been increasingly put to use. New products are introduced to consumers, new policies to nations, and community development ideas to underprivileged groups through SNA. In section 5.3 a plan was described in which the Nepali community in Chiang Mai could disseminate information about language preservation, through an after-school study program for children. Innovation may be a more strategic use of SNA than the identification of language shift or maintenance.