

The role of network centrality in the flow of consumer influence

Seung Hwan (Mark) Lee*, June Cotte, Theodore J. Noseworthy

University of Western Ontario, Richard Ivey School of Business, 1151 Richmond Street North, London, Ontario, Canada N6A 3K7

Received 19 September 2008; revised 7 October 2009; accepted 14 October 2009

Available online 7 November 2009

Abstract

The authors find that a consumer's position in a social network is related to both opinion leadership and susceptibility to influence. Using two field network studies, the authors show that people see themselves as opinion leaders when they perceive that they are popular (i.e., central) in the network. However, these self-assessments are sometimes at odds with the perceptions of the rest of the network. Counter-intuitively, the authors demonstrate that consumers who are central in networks are quite susceptible to others' influences. The findings extend the field's knowledge by demonstrating how network centrality is associated with consumer influence.

© 2009 Society for Consumer Psychology. Published by Elsevier Inc. All rights reserved.

How do consumers influence one another? In the past, studies have generally followed one of two traditions. At the micro-level, researchers have studied how individual actors interact with other actors to transmit information and influence one another (Katz & Lazarsfeld, 1955). At a more macro-level, researchers have studied how the structure of channels and networks direct the flow of information and influence (Brown & Reingen, 1987; Granovetter, 1973). Our study is situated in the latter tradition. We examine the structural elements of social networks as they determine how consumers interact, influence or exchange information with one another. With the recent burgeoning of interest in peer-to-peer networks, we believe it is an apt time to revisit social network theory for a nuanced study of how influence manifests in a consumer network.

Influence in networks

Katz and Lazarsfeld's (1955) model of a two-step flow of communication stands as one of the seminal models for marketing research (Burt, 1999; King & Summers, 1970). Information is passed on from marketers to market influencers (e.g., opinion leaders), which subsequently is passed on to other consumers within the influencer's respective network. The

model rests on two rudimentary assumptions: (1) the market influencer has the *ability* to diffuse information, and (2) the market influencer has access to a *network* of people by which to exercise this ability. As such, research in this field has diverged, with the dominant stream focusing on the *ability* and characteristics of market influencers to pass on the information, and the other stream focusing on how the structural aspects of *networks* affect information exchange and word-of-mouth (e.g., Brown & Reingen, 1987; Reingen & Kernan, 1986; Sirsi, Ward, & Reingen, 1996).

Given the emphasis put on both streams in the past 60 years, surprisingly little attention has been devoted to integrating the two. Our research aims to incorporate the *ability of the influencer with the structure of the network* by examining how the structural positions of actors within social networks are associated with opinion leadership and susceptibility to influence. As interpersonal influence is a social phenomenon, the extent to which individuals are influenced by others should be dependent not only on the relationship components of social networks, but also on the actor's structural position within their network. In a novel way, we demonstrate that the structural position of an actor in a network is not only related to their ability to be opinion leaders, but also to the extent to which they are more susceptible to interpersonal influence.

The literature on both opinion leadership and consumer susceptibility to interpersonal influence has largely ignored, at least from an empirical standpoint, the structural dimensions of

* Corresponding author. Fax: +1 519 661 3955.

E-mail addresses: mlee@ivey.uwo.ca (S.H.(M.) Lee), jcotte@ivey.uwo.ca (J. Cotte), tnoseworthy@ivey.uwo.ca (T.J. Noseworthy).

consumers' networks. Previous network researchers have predominantly focused on the relationship components of networks such as strength (weakness) of ties, homophily, and reference groups (e.g., Brown & Reingen, 1987; Granovetter, 1973). This happened despite scholars emphasizing the importance of social location (i.e., structural position) and the degree of relationship these consumers have with other consumers inside their network (Burt, 1999). This lack of emphasis on the properties of social networks suggests that despite the large amount of research devoted to the topic, we are still unsure whether the influence on others is related to structural position, and if consumers become more susceptible to interpersonal influence when they occupy certain structural positions in their network. To address this gap, our research focuses on how a favorable network position (i.e., being in the center of a network) is associated with opinion leadership as well as susceptibility to interpersonal influence.

Social networks and marketing

Social networks are composites of interactions and connections that exist amongst a group of individuals (Iacobucci & Hopkins, 1992). Interactions within a social network are governed by two primary components: (1) individual-to-individual relationships and (2) the structural dimension encompassing those relationships (Gibbons & Olk, 2003). People can be linked with other people in a variety of ways. One way is through building and maintaining ties in their friendship networks (Baldwin, Bedell, & Johnson, 1997). Friendship ties are often characterized by a high frequency of interactions and have been found to be useful in providing emotional and financial support, as well as being an avenue for information and resource exchange (Gibbons & Olk, 2003). In marketing, friendship networks are important to consumers because they provide an avenue to disseminate and exchange product information and referrals (Brown & Reingen, 1987).

Diffusion of innovation theory posits that new ideas, practices, and objects become known and spread within and between communities largely through interpersonal communications (Gatignon & Robertson, 1985). Individuals within a friendship networks act as a word-of-mouth channel and as role models to inspire others to imitate their behavior (Ryu & Han, 2009). Such friends provide advice and guidance for the search, purchase, and use of products; they provide support with decision making (confirmation/disconfirmation); and they engage others in the consumption experience (Flynn, Goldsmith, & Eastman, 1996).

Network theories have been applied to a wide range of marketing issues, including diffusion and adoption of products and services (Brown & Reingen, 1987), word-of-mouth communications (Brown & Reingen, 1987; Reingen & Kernan, 1986), branding use and preferences (Reingen, Foster, Brown, & Seidman, 1984; Ward & Reingen, 1990), information acquisition (Granovetter, 1973), and relationship marketing (Achrol, 1996). We also know from network research that common membership in cohesive subgroups is associated with common brand use and preference, and that consumers with structurally

equivalent positions in social networks have similar brand preferences (Reingen et al., 1984; Sirsi et al., 1996; Ward & Reingen, 1990). It is not just about being in a network, but where one is located in that network: one's structural network position.

Structural network position

Research has shown that an individual can occupy structural positions within a network that afford greater access to information, resources, and opportunities (Burt, 1992; Mehra, Kilduff, & Brass, 2001). Individuals in these positions tend to have higher brokerage opportunities and are better at coordinating information sharing across other actors within the network (Burt, 1992; Mehra et al., 2001). Because these individuals are well connected with others, they are in a better position to leverage their relationships to influence others and diffuse information. However, individuals in these positions may also have difficulty coordinating their relationships. Because unproductive contacts tend to expire over time, individuals must sustain a minimum interaction frequency to maintain ties and preserve their structural position (Burt, 2000). The increased responsibility of maintaining ties may require consumers to become more susceptible to influence as they work to protect their structural position.

One way to occupy a structurally advantageous position is to be central in one's network (Gibbons & Olk, 2003). Individuals who are central tend to be more active (continuously working to maintain contacts) and have more ties with other central members in the network (Faust, 1997). Centrality can be defined as either the number of ties (quantity) or the configuration of ties (strategic location). In our research, we are concerned with both *degree centrality* (a quantity measure) and *betweenness centrality* (a location measure).

Degree centrality is defined by the number of ties that are directly linked to the focal person (Freeman, 1979; Wasserman & Faust, 1994). It reflects one's popularity within a network (Van Den Bulte & Wuyts, 2007). Degree centrality can be further defined in terms of *in-degree centrality* and *out-degree centrality*. Out-degree centrality is the extent to which the focal actor has identified others as a close friend. In-degree centrality is the extent to which others in the network have identified with the focal actor as a close friend. The two yield different characteristics. Out-degree centrality is concerned with an individual's self-perception of his or her own popularity, whereas in-degree centrality is concerned with the individual's popularity as rated by others in the network (Van Den Bulte & Wuyts, 2007).

Betweenness centrality is defined as the extent to which a person falls between pairs of other people on the shortest path connecting individuals in the network (Freeman, 1979; Mehra et al., 2001). For instance, an individual is high in betweenness centrality if he/she strategically holds a position in a network such that he/she provides links to otherwise unconnected individuals. A person high in betweenness centrality represents a potential point of failure, whereby if one were to remove this person from the network, the common ties between individuals and cliques could break (Burt, 1999).

We believe that consumers in these central positions have different characteristics than those who are on the periphery of the social network, and this has important implications for marketing. Specifically, we expect individuals in these positions to be more likely to exert influence, and yet be highly influenced by others. We examine these issues of influence through opinion leadership and susceptibility to interpersonal influence. In the following sections, we briefly review the literature on opinion leadership and consumer susceptibility to interpersonal influence, and discuss how network centrality may relate to these important marketing variables.

Opinion leadership

Opinion leaders can influence the purchase behavior of other consumers because they are more involved and knowledgeable in their product field and are known to consult a greater number of sources (e.g., media) more frequently than the average consumer (Flynn et al., 1996). Opinion leaders also play a critical role in diffusing information across social systems and usually engage in word-of-mouth (WOM) behaviors with a particular predisposition towards an issue (Gatignon & Robertson, 1985). People are willing to listen to, and be influenced by, opinion leaders because they are in a desirable social position, and are often seen as a competent, unbiased source of information.

Katz (1957) originally conceptualized opinion leadership as a combination of factors. These factors include tendency, competence, and location. Tendency refers to how opinion leaders need to have an affinity to influence others, competence refers to an appropriate level of experience, and location refers to the need to be somewhat socially connected inside a network (Burt, 1999; Flynn et al., 1996; King & Summers, 1970). In this research, we focus on the location factor, unpacking the association between network centrality (both degree and betweenness centrality) and opinion leadership.

We expect *degree centrality* to be associated with opinion leadership for three reasons. First, individuals with high degree centrality have more ties to other individuals, from whom they can gain network information and resources. The more direct the ties that individuals accumulate, the more informed and aware they become about each individual member (Carley & Krackhardt, 1996). Consequently, they gain access to more diverse information about the network. Even though the information gathered may be redundant, it can be verified or disconfirmed. This ability to continuously update existing information allows central people to accumulate higher quality information (Coleman, 1988), which in turn allows them to be more strategic when targeting information receivers (Gibbons & Olk, 2003). Second, we believe that having a greater number of ties will be associated with opinion leadership. In order to influence others, there has to be nodes of people to whom the focal actor can distribute the information (Katz & Lazarsfeld, 1955). Thus, we expect that people with larger number of ties will also have greater influence than those with smaller number of ties. Third, individuals who are high in degree centrality usually have a greater self-perception of having power in their

network (Brass & Burkhardt, 1993). Consistent with identity-based motivation theory (Oyserman, 2009), we expect central people to engage in identity-congruent actions. Thus, an elevated perception of power provides these individuals with the confidence necessary to be more outspoken about a variety of topics. For these three reasons, it is likely that there will be a positive association between degree centrality and opinion leadership.

People high in *betweenness centrality* are known as the gatekeepers of information due to their unique broker position (Gibbons & Olk, 2003). Individuals occupying this position have the ability to share, withhold, or manipulate information as they pass it on to others (Burt, 1999). Given this enhanced opportunity to diffuse and coordinate information, these individuals are privileged by their ability to span and integrate different clusters of people and subgroups within the network. The most effective opinion leaders are not necessarily the leaders of the network, but brokers within the network (Burt, 1999). These are the people who are more expressive with their ideas, more likely to have their ideas be valued by others, and less likely to have their ideas ignored by others (Burt, 2004). Therefore, we expect betweenness centrality to be positively related to opinion leadership, because individuals in these highly central positions not only have greater access to subgroups of individuals across the network, but also hold the unique advantage of being able to provide others with information that is perceived to be of high value.

Consumer susceptibility to interpersonal influence

Consumer susceptibility to interpersonal influence is defined as the need to identify or enhance one's image through the acquisition of products and brands that conform to the desires of others (Bearden, Netemeyer, & Teel, 1989). Interpersonal influence has two separate dimensions: informational and normative (Deutsch & Gerrard, 1955). Informational influence is the tendency to accept information from others as evidence of reality, or to make inferences based on others' behavior, while normative influence is the tendency to conform to the expectations of others (Bearden et al., 1989; Deutsch & Gerrard, 1955).

We expect *degree centrality* to be positively related to consumer susceptibility to interpersonal influence for several reasons. Central individuals have greater prospects of forging diverse ties with others in the network, and advice from these diverse social ties will be more useful than advice from less diverse ties (Constant, Sproull, & Kiesler, 1996). Since advice from more people is usually more useful than advice from fewer people, this will provide individuals with greater opportunity to learn about the topic. More advice can also help confirm and disconfirm certain information, which can assist in adjudicating conflicting information. This line of reasoning suggests that people in central positions are more likely to receive useful advice than those in the periphery parts of the network, and thus are also more susceptible to influence in part because they are receiving a higher quantity of useful information. Moreover, because central individuals are known to have a desire for

maintaining their position (Baldwin et al., 1997), they may be motivated to scan the network for information that is viewed as trendy or popular. This motivation to keep up with the current trends of the network encourages them to be more open and susceptible to information provided by others. Therefore, counter-intuitively, we believe individuals with high degree centrality will be more susceptible to peer influence than those with low degree centrality.

We also expect that as a result of having access to more (and more diverse) information, *betweenness centrality* will be positively associated with consumer susceptibility to interpersonal influence. As we outlined above, one advantage of being between others in one's network is the possibility of receiving non-redundant information and innovations from unconnected parts of the network (Burt, 1992). As such, individuals in these brokering positions have the potential to receive the most diverse amounts of information, and more of it. Especially if this information is high quality, consumers in this position will be vulnerable to influence from this information (i.e., influence from others).

Moreover, individuals in the betweenness central position may play a role in satisfying the needs of different cliques, subgroups, and individuals in the network. Because of their unique brokering position, they will likely be more attentive to their reputation and image within different subgroups in the network (Mehra et al., 2001). In order to satisfy and meet the norms of multiple groups, they may need to be more open-minded and susceptible to the ideas and activities endorsed by these subgroups to maintain their structural position. Therefore, we expect there to be a positive relationship between betweenness centrality and susceptibility to interpersonal influence.

We examine influence in consumer networks with two studies of disparate social networks, using a survey-based approach to social network analysis. The strengths of this approach include locating the structural position of actual consumers in the network, outlining the structural properties of networks that cannot be extracted from a study of individuals, and tracing the interpersonal relationships between individuals (Reingen & Kernan, 1986; Webster & Morrison, 2004). In addition, because the data is based on collecting *who talks to whom* and *who influences whom*, we are able to track the degree of influence between people (Wasserman & Faust, 1994). A final advantage is the ability to identify key actors (centrality) in the network (Borgatti, 2006).

Study 1

In this study, we collected data from a group of 125 members of an ethnic social club at a large Canadian university. To become a member of this social club, students were required pay a membership fee at the beginning of each academic year to have access to the services and activities offered by the club. Some of these services included social dinners, sports day, academic presentations, karaoke nights, banquet formals, and a talent competition. Registered members received special entry and/or discounts to participate in these activities. We chose this

group as a research destination because a formally bounded network is useful in identifying members who are central to their network (Scott, 2000). This allows us to better capture the *structure* of relationships in a real network (Reingen & Kernan, 1986), and the use of a formally bounded network to study structural properties is consistent with previous network studies in consumer behavior (Reingen et al., 1984).

Network data was collected using an online questionnaire. To encourage participation, we provided monetary incentives of \$5. In total, 75 of 125 students registered as members participated in our study, for a response rate of 60%.

We collected network data using the roster method (Scott, 2000; Wasserman & Faust, 1994). In this method, participants were provided with an alphabetical listing of the names of all of the club members, and we asked each person to rate their degree of friendship (closeness) with each member on the list. We chose the roster method over alternative methods for several reasons. The roster method allows us to map out the patterns of relationships between all actors—a requirement necessary to determine centrality properties among the actors. It is also a widely used method in social network research (e.g., Gibbons & Oik, 2003; Mehra et al., 2001). More importantly, the use of the roster method is preferred over alternative methods because it is not subject to recall bias; otherwise, participants have a tendency to only report their strongest ties, providing an incomplete view of the macro social network (Wasserman & Faust, 1994).

Measures

Centrality

In this study, we measured two types of centrality: degree centrality and betweenness centrality. To measure degree centrality (in-degree and out-degree centrality), we created a 75×75 friendship matrix generated from the network data to calculate each participant's in-degree and out-degree centrality scores. In-degree centrality was calculated by taking the total number of members nominating the focal person as a "close friend." We chose close friends as our level of analysis, as this criterion resulted in an identification of strong-tie networks (Sirsi et al., 1996). The focal actor received a score of 1 for every time someone nominated the focal actor as a close friend and 0 for any other cases. That is, in-degree centrality is *others' views* of the person's centrality. Out-degree centrality is equal to the total number of people the focal person nominated as close friends. The focal individual received a score of 1 for every nomination of someone he/she designated as a close friend. That is, out-degree centrality is *one's own view* of one's centrality.

We also used the 75×75 matrix based on the close friendship data to calculate the betweenness centrality scores of each participant in the network. We used symmetric data for the friendship matrix, such that the friendship was coded as a 1 when both members of a dyad identified each other as a close friend. In all other cases, the relationship between the dyad was coded as 0. Use of symmetric data is recommended to enhance interpretability of betweenness centrality scores (Mehra et al.,

2001). Finally, we entered the 75×75 friendship matrix into the social networks software UCINET (Borgatti, Everett, & Freeman, 2007) to calculate the differences in the centrality scores for each member compared to every other member.

The creation of difference centrality scores is necessary because we analyzed the data using multiple regression quadratic assignment procedure (MRQAP; Gibbons & Olk, 2003; Krackhardt, 1993). MRQAP is a method that has been used in social network analysis and is useful in analyzing dyadic sets of data. MRQAP is a non-parametric test that tests for structural similarity between two matrices. The analysis tests the likelihood that the existing correlations between the matrices have resulted by chance. More specifically, the null hypothesis is that the permutations of columns and rows of both the independent and dependent variable are equal to one another (see Gibbons & Olk, 2003 for a more extensive review). Because each member's betweenness centrality scores are dependent on the entire structure of the network (and independence between observations cannot be assumed), the use of a non-parametric test, like MRQAP, is necessary to overcome the problems of non-independence of data points.

Opinion leadership (OL-a)

Opinion leadership was measured using a scale adapted by Flynn et al. (1996). We chose to use this scale over Childers' (1986) opinion leadership scale as we are interested in observing the flow of influence, as were Flynn et al., rather than product communication, which was Childers' focus. The 6-item opinion leadership scale was scored on a 7-point Likert-type scale ranging from 1 to 7 with descriptive anchors "Strongly Disagree" and "Strongly Agree." However, we dropped 2 of the 6 items as they did not load well on the OL construct after our test for unidimensionality. Confirmatory factor analysis revealed that the remaining 4 items all loaded .78 and higher with adequate fit (CMIN/DF=1.16, NNFI=.93, CFI=.99, RMSEA=.047), thereby indicating unidimensionality (Steenkamp & Van Trijp, 1991).

Because opinion leadership is most appropriately measured with domain-specific instruments, we modified the scale to directly represent opinion leadership regarding the club's events and activities (Flynn et al., 1996). Sample items from the scale include, "People that I know participate in club XYZ's events and activities based on what I have told them" and "I often influence people's opinion about XYZ's events and activities." The internal consistency (Cronbach alpha) of the 4-item measure of opinion leadership was .90.

Consumer susceptibility to interpersonal influence (CSII-a)

Consumer susceptibility to interpersonal influence was measured using a scale developed by Bearden et al. (1989). This scale has 12 items, reflecting the two separate dimensions (informational and normative) and includes both sub-dimensions of normative influence (value expressiveness and utilitarian behavior.) The 12-item scale was scored on a 7-point Likert-type scale ranging from 1 to 7 with descriptive anchors "Strongly Disagree" and "Strongly Agree." Sample items from the scale are, "I achieve a sense of belonging by

purchasing the same products and brands that others purchase" (normative) and "I frequently gather information from friends and family before I buy (informational). The Cronbach alphas for the normative dimension and the informational dimension were .92 and .82, respectively.

Alternative measurements of OL and CSII

We also devised an alternative method of operationalizing the two constructs (OL and CSII) using the network data itself. There are two main reasons for assessing our ideas in this alternative way. First, both opinion leadership and consumer susceptibility to interpersonal influence are self-reported, and this could lead to biases due to both common methods and social desirability. Instead, what we created are, in essence, others' views of a focal actor's opinion leadership and CSII, rather than the focal actor's view of him or herself. For instance, there may, or may not be, a difference between a high school freshman's perception of her own opinion leadership and susceptibility to social influence, and her peer's perception of her influence and susceptibility. Our two measurements allow us to examine influence from the actor's perspective and from others' perspectives. Along with asking each member about their degree of friendships with others, we asked them to rate every other member on a 7-point Likert-type scale (1—Never; 4—Sometimes; 7—Always) on the extent to which they would be persuaded by that particular member to participate in club XYZ's events and activities, and the extent to which they persuade that particular member to participate in club XYZ's events and activities. This way, we were able to track how much the focal actor was perceived by others to be susceptible to influence by each and every other member in the network and also assess the degree to which the focal actor was perceived by others to be influential in the network.

By transposing the two matrices such that columns become rows, and vice versa, we were able to assess the influence of the focal actor on others, and the influence of others on the focal actor, as perceived by the members of the network. Therefore, this measurement is not self-reported, but compiles the ratings of others in the network. We then created an index score for each member's susceptibility to influence (CSII-b, consumer susceptibility to interpersonal influence alternative) and his/her ability to influence (OL-b, opinion leadership alternative). CSII-b and OL-b were created by taking the average scores of every member's rating of the focal actor. It is reasonable that these index scores skew negatively, because not everyone in the network will know each other (when two people do not know each other, this was necessarily coded as a 0). Because our alternative variables were designed to measure the member's CSII-b and OL-b in relation to their immediate network, it was necessary to include all scores despite the large numbers of 0s in the matrix. These alternative measurements were designed to provide a more conservative test of our theory. We were concerned that the self-reported data on opinion leadership and susceptibility to interpersonal influence could be correlated due to similar social desirability biases or the need for consistency. Our alternative measures eliminate this concern.

Control variables

Studies have shown that the extent to which people derive benefits from their structural positions in a social network may differ based on demographic differences (Mehra, Kilduff, & Brass, 1998). Hence, we controlled for age and gender in our study.

Data analyses

The data was analyzed using both ordinary least squares (OLS) and multiple regression quadratic assignment procedure (MRQAP). Past researchers have noted the limitation of using OLS regression in network analyses, as network data do not fulfill the assumptions of independence of observation (Gibbons & Olk, 2003). MRQAP is a non-parametric alternative that allows us to test network data without violating the parametric assumptions associated with OLS regression (Krackhardt, 1993). However, for degree centrality, we can use OLS regression, as the number of ties a member is connected to does not depend on the entire structure of the network and can be assumed an individual, independent measure. However, for our other centrality measures, such as betweenness centrality, the centrality score is dependent on the structure of the entire network. Therefore, MRQAP analysis was necessary to run regressions involving betweenness centrality.

MRQAP accepts data in an actor-by-actor matrix form only. To use single column vector variables such as gender, age, opinion leadership, and consumer susceptibility to interpersonal influence, similarity, or difference matrices need to be created. For example, for vector attributes with binary (0,1) values (e.g., gender), a similarity matrix was created. If participant “X” matched the gender of participant “Y,” the corresponding row and column received a score of 1. If there was no match in gender between actor X and actor Y, then the corresponding row and column received a score of 0. For each continuous variable, difference matrices were created. The difference matrix was calculated by taking the score of actor “X” and subtracting it from the scores of all of the other members. Then we take the next actor and subtract his/her score from all of the other members. The similarity and difference matrices are used in MRQAP regression (see Krackhardt, 1993 for further review).

Results

Means, standard deviations, and Spearman correlations are reported in Table 1. We used Spearman correlations, as these are non-parametric tests that do not assume independence of observations. In the sample of 75 respondents, there were 40 males and 35 females that participated in the study. The participants’ ages ranged from 18 to 28, with an average age of 20.5. Average tenure of membership was 2.0 years, and all participants were the same race. Also, both the average of each respondent’s out-degree score and the average in-degree score was 3.9, meaning that the number of close friends a person perceived themselves to have was equal to the number of people that nominated that person as a close friend.

Opinion leadership

The data demonstrate a positive relationship between centrality and opinion leadership. For analyses involving degree centrality we used OLS regression, but for analyses involving betweenness centrality, we used MRQAP regression to test the significance of the relationship. As described above, we devised two distinct ways to measure and analyze opinion leadership. In analysis A, we used a self-reported scale to determine how each member evaluates their own degree of opinion leadership (OL-a) in the network. In analysis B, we assessed opinion leadership (OL-b) by taking the average score of the degree to which every other member in the network perceived the focal person to be influential regarding the club’s events and activities. In analysis A, out-degree centrality was positively associated with opinion leadership (OL-a) ($\beta = .18$, $t(74) = 3.84$, $p < .001$), and it explained a significant portion of the variance in the opinion leadership measurement ($R^2 = .20$, $F(4, 74) = 4.43$, $p < .01$). In-degree centrality was not a significant predictor of opinion leadership ($p > .05$). Betweenness centrality was positively related to OL-a ($\beta = 13.30$, $p < .01$). Please see Table 2 for the detailed analysis. In analysis B, we used MRQAP regression for all centrality measures, as we cannot assume independence of observations; MRQAP regression also overcomes the skewness of the distribution ($M = 1.34$), as the test does not assume a normal distribution.

Table 1
Study 1 (student’s network): overall means, standard deviations, and Spearman correlations.

	Mean (SD)	1	2	3	4	5	6	7	8	9	10
1. In-degree centrality	3.39 (2.32)	1									
2. Out-degree centrality	3.39 (3.79)	.04	1								
3. Betweenness centrality	.020 (.030)	.53***	.72***	1							
4. Opinion leadership	4.23 (1.61)	-.19	.33**	.12	1						
5. OL-b	1.34 (.228)	.53**	.18	.41***	-.13	1					
6. Normative influence	3.76 (1.27)	-.14	.32**	.26*	.35**	-.06	1				
7. Informational influence	4.77 (1.06)	-.04	.34**	.32**	.22	-.03	.47***	1			
8. CSII-b	1.35 (.315)	-.12	.50***	.34**	.22	.07	.33**	.24*	1		
9. Gender	n/a (n/a)	-.10	-.05	-.05	-.07	-.05	-.05	-.06	-.24*	1	
10. Age	20.45 (1.86)	.11	.12	.14	-.10	.11	.10	-.23*	.04	-.02	1

Significance levels: *** $p < .001$, ** $p < .01$, * $p < .05$.

Table 2
Study 1 (student's network): results of OLS and MRQAP regression for network centrality (OL and CSII).

In-degree/out-degree centrality	OL-a β	OL-b β	CSII-a β (Inform.)	CSII-a β (Norm.)	CSII-b β
	OLS	MRQAP	OLS	OLS	MRQAP
Degree Centrality Gender	.01 (n.s.)	.00 (n.s.)	.06 (n.s.)	.02 (n.s.)	<.001 (n.s.)
In-Degree/Out-Degree Centrality Age	-.12 (n.s.)	.01 (n.s.)	-.11 (n.s.)	.10 (n.s.)	<.01 (n.s.)
In-degree centrality	-.12 (n.s.)	.01 (.015)	-.03 (n.s.)	-.12 (n.s.)	-.002 (n.s.)
Out-degree centrality	.17 (.000)	.00 (n.s.)	.11 (.001)	.12 (.002)	.02 (.000)
R^2	.20	.09	.16	.18	.39
<i>Betweenness centrality</i>					
Gender	.00 (n.s.)	.00 (n.s.)	<.001 (n.s.)	<.001 (n.s.)	<.001 (n.s.)
Age	-.03 (n.s.)	.01 (n.s.)	-.11 (n.s.)	.091 (n.s.)	.01 (n.s.)
Betweenness centrality	13.3 (.002)	1.41 (.045)	10.6 (.004)	10.7 (.011)	3.26 (.010)
R^2	.09	.04	.15	.09	.10

Note. Unstandardized regression coefficients are shown. The significance levels are shown in parentheses. Inform., informational influence; Norm., normative influence.

In analysis B, degree centrality and betweenness centrality were both positively related to opinion leadership. More specifically, we found that in-degree centrality is positively associated with OL-b ($\beta=.01$, $p<.05$). However, unlike in analysis A, it was in-degree, not out-degree centrality, which significantly related to OL-b. When opinion leadership was self-reported (OL-a), it was out-degree that positively correlated with opinion leadership, whereas when opinion leadership is reported by other members in the network (OL-b), it is in-degree that positively correlates with opinion leadership. Nevertheless, we found support for a positive relationship between degree centrality and opinion leadership. In addition, betweenness centrality was positively related to OL-b ($\beta=1.41$, $p<.05$). Consistent with analysis A, this result supports the notion that betweenness centrality positively relates to opinion leadership (see Table 2).

Consumer susceptibility to interpersonal influence (CSII)

Similar to opinion leadership, we devised two ways to measure and analyze consumer susceptibility to interpersonal influence. In analysis A, we used a self-reported scale to determine how each member rated their general susceptibility to interpersonal influence. In analysis B, we assessed CSII by taking the average score of how each member rated everyone else as being influential to them regarding the club's events and activities.

In analysis A we found that out-degree centrality is positively related to both the normative ($\beta=.12$, $t(74)=3.21$, $p<.01$) and the informational ($\beta=.11$, $t(74)=3.39$, $p<.01$) dimensions of influence. Out-degree centrality also explained a significant portion of the variance of the two dimensions: $R^2_{\text{normative}}=.18$, $F(4, 74)=3.86$, $p<.01$ and $R^2_{\text{informational}}=.16$, $F(4, 74)=3.44$, $p<.05$. There were no significant results for in-degree centrality ($p>.05$). Further examination revealed that betweenness centrality was positively related to both the normative ($\beta=10.7$, $p<.05$) and informational ($\beta=10.6$, $p<.01$) dimensions of CSII-a. In analysis B, we once again used MRQAP regression for all of our centrality measures for CSII-b. The results from analysis B are consistent with

analysis A. Specifically, we found that out-degree centrality is positively correlated with CSII-b ($\beta=.02$, $p<.01$), and betweenness centrality is positively correlated with CSII-b ($\beta=3.26$, $p<.05$). Table 2 details these findings.

Discussion

Overall, the results support our idea that social network centrality is positively correlated with both opinion leadership and consumer susceptibility to interpersonal influence. For opinion leadership, we found, perhaps not surprisingly, differential effects between out-degree and in-degree centrality on self-reported scale measures (versus a network measure) on our two dependent variables. Our results show that people think of themselves as opinion leaders if they perceive that they are popular (central) in the network. However, those looked to as opinion leaders are only those who are viewed by others as central. Additionally, the results show that network centrality and susceptibility to others' influences positively covary, and we found that those who perceive themselves as central (out-degree) are those who are most susceptible to interpersonal influence. We suspect this is because as central consumers are exposed to a greater variety of information from different interest groups, they must somehow absorb this information in order to maintain ties, and thus maintain their central position. There are differences between out-degree and in-degree centrality, and individuals who are betweenness central were more influential *over others*, but were also likely to be influenced *by others*.

Our alternative measures of OL and CSII are novel, and we recognize the limitation of conducting a study of influence within one racial/national group (all members of the social club were from the same Asian country). In addition, as our response rate was 60%, we felt that our measures of network centrality were inevitably affected by non-response. We conducted a second network study to further validate our alternative measures of OL and CSII, increase response rate, and increase external validity using a different type of social network.

Study 2

We collected data from a group of 40 members from a senior’s activity club (SAC) located in a city in central Canada. This club provides senior citizens with opportunities to socially connect with other seniors in the local neighborhood area (a diagram of the network is presented in Fig. 1). In this club, seniors are required to pay a membership fee at the beginning of each calendar year to have access to the services and activities offered by the club. Some of the services offered by the club include shopping trips, bingo nights, coffee socials, and holiday season parties. This replicates the type of social events and activities we assessed in study 1.

We collected our data using a paper-and-pen questionnaire that was prepared for all 40 members of SAC. To encourage participation, we provided cash incentives to both the club and the participants (\$5 to the participant and \$7 to the club for every survey returned). In total, 30 of the 40 seniors completed and returned the questionnaire (a response rate of 75%), which is quite reasonable for examining social network structure (Burt & Minor, 1983). Our research design and procedures remained similar to those we outlined in study 1. Particularly, we were interested in replicating the results for our alternative measurements of our key dependent variables (OL-b and CSII-b). We added additional control variables to our study, including years

of club membership and expertise (Flynn & Goldsmith, 1999; $\alpha = .91$), age, and gender.

Results

Means, standard deviations, and Spearman correlations of the relevant variables are reported in Table 3. In the sample of 30 respondents (24 female), the average age was 75.7 and the average tenure of club membership was 6.5 years. The average of each respondent’s out-degree score was 6.2, while the average in-degree score was 4.9. This means that on average, people perceived themselves to have more close friends than they actually did (according to others).

We found similar results for the influence of the social network on consumers, offering encouraging evidence of a more generalizable finding across the two studies. Despite research which suggests older consumers may have unique decision making processes (Yoon, Cole, & Lee, 2009), we find converging results between the student group and the elder group. Replicating study 1, in-degree centrality was positively related to OL-b (opinion leadership) ($\beta = .11, p < .001$) and out-degree centrality was positively related to CSII-b (susceptibility to interpersonal influence) ($\beta = .12, p < .001$). Betweenness centrality was again positively related to both opinion leadership ($\beta = 7.02, p < .01$) and susceptibility to interpersonal influence

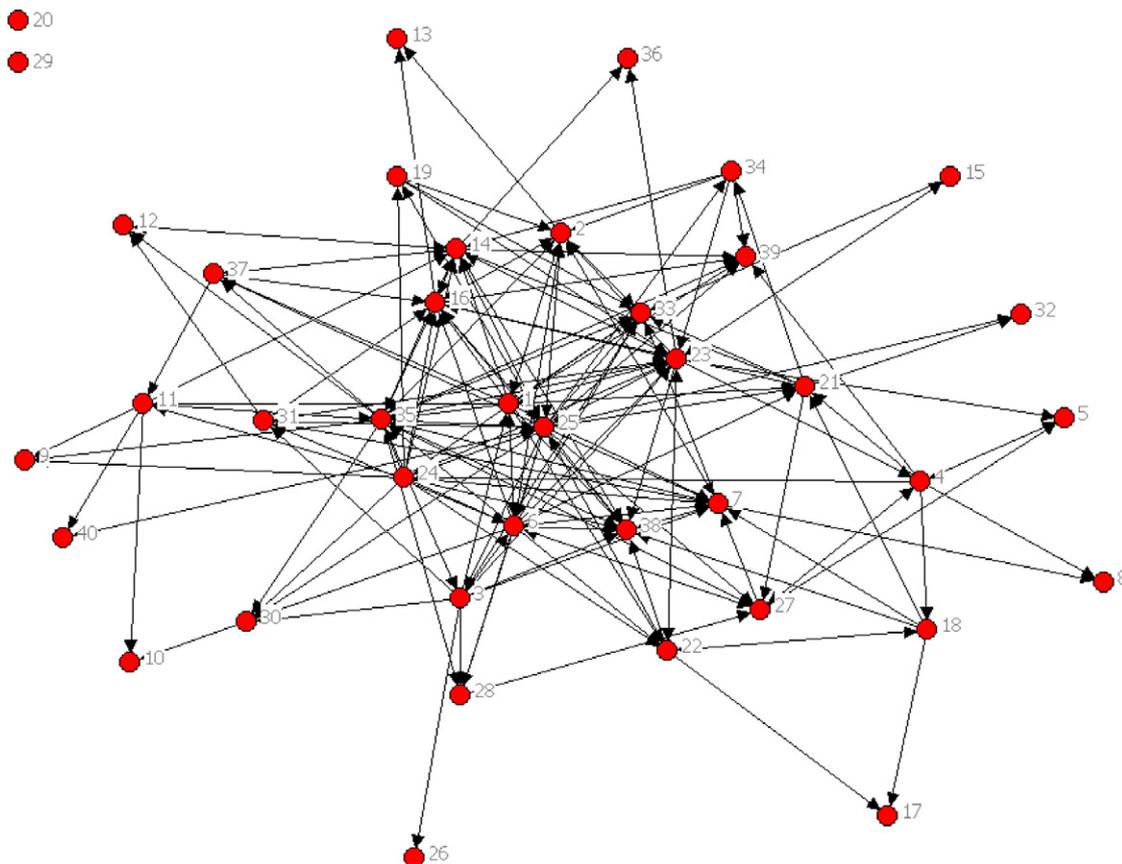


Fig. 1. Senior’s activity club network diagram. ***Note: The circle dots indicate nodes (members of the network). Participants 20 and 29 indicated that they had no close friends in the network. The directions of the arrows indicate the direction of the nomination. For example, 18 considers 17 to be a close friend; however, 17 does not consider 18 to be a close friend. For double arrows (e.g., 16 \leftrightarrow 23), this indicates that both members nominated each other as a close friend.

Table 3
Study 2 (senior's network): overall means, standard deviations, and Spearman correlations.

	Mean (SD)	1	2	3	4	5	6	7	8
1. In-degree centrality	4.90 (3.28)	1							
2. Out-degree centrality	6.13 (5.66)	.51**	1						
3. Betweenness centrality	0.26 (0.33)	.65**	.90**	1					
4. OL-b	1.78 (.51)	.84**	.57**	.61**	1				
5. CSII-b	1.99 (.71)	.19	.67**	.62**	.32	1			
6. Gender	n/a (n/a)	-.01	-.10	-.03	.11	-.13	1		
7. Age	75.7 (7.99)	-.08	-.33	-.19	-.14	-.32	.20	1	
8. Member	6.50 (4.59)	.46*	.42*	.36*	.41*	.10	.05	-.09	1

Significance levels: *** $p < .001$, ** $p < .01$, * $p < .05$.

($\beta = 10.98$, $p < .01$). Overall, we found consistent results using the same alternative operationalization of opinion leadership and consumer susceptibility as we did in study 1. This provides further evidence for our proposed relationships. Results of study 2 are shown in Table 4.

General discussion

This research is among the first studies in consumer behavior to examine the effects of centrality on social influence variables from a social network perspective. Our study differs from, and provides a contribution to, the extant literature by recognizing that there are unique opportunities and advantages from occupying certain structural positions in a social network. Overall, the results of our research generally support the notion that occupying a central position in a network is related to the degree to which individuals are opinion leaders and are susceptible to influence. That is, while these individual differences are important, network structure also influences them. The context of the social situation helps create them.

With regards to opinion leadership, our finding that betweenness centrality is positively related to opinion leader-

ship confirms our prediction that brokers of the network, who are structurally located advantageously to span across unconnected individuals or subgroups, are those who will be most influential in the network, as they hold a unique position which allows them to reach others with optimal efficiency. Therefore, we highlight the importance of occupying a structurally advantageous position for influence in the social network.

Regarding degree centrality, we found out-degree (but not in-degree) centrality to be positively related to opinion leadership, but only when opinion leadership was self-reported. We also found that in-degree (but not out-degree) centrality was associated with opinion leadership when opinion leadership judgments were taken from the other people in the network. We replicated these findings in both of our network studies. This discrepancy in our findings can be explained using a social constructivist argument. Numerous studies in social psychology have purported that social perceptions create social realities (Jussim, 1991). Individuals tend to create beliefs, stereotypes, and expectations about reality largely based on their own perceptions about reality. We feel that the differences in our results are explained by the contrasting methods we deployed to measure opinion leadership. When opinion leadership was measured by a self evaluation of one's degree of influence in the network, we found only out-degree centrality to be positively significant. We believe that the degree to which individuals perceive themselves to be popular among their friends (the number of close friends people perceive they have within the network) is a reflection of how much influence they believe they have on the network. In other words, the extent to which people feel that they are influential is largely based on their perception of their own popularity within the network. Therefore, it is reasonable to believe that people will rate themselves higher as an opinion leader if they perceive that they have more friends over whom they can exert their influence.

On the other hand, when opinion leadership was measured using the network data, we found only in-degree centrality to be positively significant. Social psychologists have also acknowledged that people's errors and mistaken beliefs may also create what appears to be a social reality even though these perceptions may not accurately reflect reality (Jussim, 1991). In other words, perceptions may not always reflect reality, which explains why we did not find consistent results between the two methods. What we can conclude is that the opinion leaders (as rated by others), who actually hold the power of influence

Table 4
Study 2 (senior's network): results of MRQAP regression for network centrality (OL-b and CSII-b).

	OL-b β	CSII-b β
	MRQAP	MRQAP
<i>In-degree/out-degree centrality</i>		
Gender	.00 (n.s.)	.00 (n.s.)
Age	.00 (n.s.)	-.01 (n.s.)
Years of membership	.00 (n.s.)	-.02 (n.s.)
Expertise	.10 (.039)	-.04 (n.s.)
In-degree centrality	.11 (.000)	-.01 (n.s.)
Out-degree centrality	.01 (n.s.)	.12 (.000)
R^2	.72	.69
<i>Betweenness centrality</i>		
Gender	.00 (n.s.)	.00 (n.s.)
Age	-.01 (n.s.)	-.03 (n.s.)
Years of membership	.11 (n.s.)	-.01 (n.s.)
Expertise	.02 (n.s.)	.00 (n.s.)
Betweenness centrality	7.02 (.003)	10.98 (.002)
R^2	.42	.33

Note. Unstandardized regression coefficients are shown. The significance levels are shown in parentheses.

over others, are those who were most frequently nominated as close friends by their peers in the network. But when individuals believe that they are opinion leaders, it is largely because they perceive themselves to be popular (they believe they have many close friends). However, those that were voted often by others as close friends were people who were considered to be most influential by others in the network, that is, who were most likely to influence consumer behavior.

While the overall concept of studying the relationship between centrality and opinion leadership may not be novel (e.g., Burt, 1999), one important contribution from our studies is that the extent to which people perceive themselves as opinion leaders, or are considered by others to be opinion leaders, is dependent on whether they perceive themselves to be popular (out-degree centrality) or are rated by others as popular (high in-degree centrality) in the network. Beyond its theoretical interest, this has practical implications for how we measure opinion leadership.

Turning now to consumer susceptibility to interpersonal influence, we again found converging results between the two operationalizations. Overall, we found that out-degree centrality and betweenness centrality were positively related to susceptibility to influence. When consumers self-reported their susceptibility to influence, we found out-degree and betweenness centrality to positively predict both dimensions (informational and normative) of CSII. We also found similar results for our alternative measure of CSII, as both out-degree and betweenness centrality were positively and significantly related to the extent which individuals were influenced by others. Our results suggest that those who perceived themselves as having many close friends, as well as those who actually hold brokering positions in the network, were those that were most susceptible to influence.

This susceptibility to influence result has very interesting implications. Previous research has posited the idea that those generally in the periphery of the network are those that look for support from others to gain acceptance and to enhance their social reputation (Burt, 1999). As these periphery actors do not have much leverage in the network, it seems intuitive that these individuals would be more willing to adopt the behaviors of others or comply with the expectations of others. However, the results of our study reveal that people who hold central positions, not peripheral positions, are those that were most susceptible to influence. Individuals in central positions are motivated to maintain their structural status, as this provides them with many benefits such as popularity, power, prominence, and influence (Bonacich, 1987). Because individuals in these central positions have a vested interest in protecting their structural position, it is reasonable that they need to be open to influence. When individuals in peripheral positions do not succumb to interpersonal pressures or influence, the consequences to their structural status in the network are relatively minor. For individuals in highly central positions, the social consequences can be more severe. For example, someone with high centrality, who bridges and appeals to different individuals/subgroups within the network, must be open to the influential pressures of these individuals/

subgroups to maintain ties and structural position. A resistance towards such influence could possibly weaken or harm relationships.

Because relationships with unproductive contacts tend to expire over time (Burt, 2000), it is necessary for individuals to actively keep interpersonal relationships with others in the social network. This may require individuals, particularly those in highly central positions, to become more open to influence as they have the responsibility of balancing their flow of influence from different parts of the network. Therefore, contrary to what is expected from the prior literature, we demonstrate that even the most popular individuals are susceptible to influence.

Limitations and directions for future research

Our research has several limitations. The main one is inherent in the correlational data we collected with our survey methodology. We did not argue herein, nor could we establish, the causal direction between network position and influence. Future research could explore the very interesting question of whether network position itself causes the degree of influence we saw here, or whether having a higher degree of influence causes one's position in the social network. This is a difficult issue to address, but could yield intriguing process-level understanding.

Second, as with other network studies in consumer behaviour, our study is limited within the context of the artificial boundary of the social networks. The extent to which people influence or become influenced can obviously be dependent on factors external to these networks. Although we acknowledge the limitations of network analysis, we believe that the benefits of understanding the structural element of networks overcome the problems of the artificial boundary. Third, we acknowledge that people have different definitions of who they consider others as a close friend versus a friend or an acquaintance. Therefore, our network may have been affected by differences in individuals' interpretation. Finally, we acknowledge the limitation of obtaining self-reported data of opinion leadership (OL-a) and consumer susceptibility to interpersonal influence (CSII-a) with regards to common methods bias. However, we believe we overcame these limitations by designing alternative operationalizations (OL-b and CSII-b) and demonstrating their effectiveness in two disparate networks.

Despite these limitations, in addition to our theoretical contributions, we provide a contribution to the marketing literature from a methodological standpoint. Specifically, we demonstrate how social network analysis can identify the quantitative structural properties of networks that cannot be realized from the study of individuals' characteristics or from traditional dyadic analysis. Other marketing studies that have attempted to capture relational data using traditional sample survey methodology and the use of retrospective data suffer from inaccurately describing properties of networks and connections between individuals (Reingen & Kernan, 1986). Some marketing studies attempting to study networks have simply gathered information on the characteristics of networks

such as size, frequency of interaction, or relationship type from the perspective of the focal actor (Webster & Morrison, 2004). One of the strengths of this study is that this is one of the first studies in consumer behavior to examine the structural properties of networks. Because interpersonal influence is a social phenomenon, the structural properties of individuals' networks are an important part of understanding the parameters of social influence.

Past network studies have shown that networks are especially important for referrals on small market services such as piano tuners and teachers, where objective information is difficult to acquire from media channels (Brown and Reingen, 1987; Reingen and Kernan, 1986). While their focus was on the strength of ties between people, we extend these previous works by suggesting that one's structural position plays a key role in whether information and influence is transmitted across the network. In other words, an actor's position in a network has a differential effect above and beyond the strength of dyadic relationships. Therefore, the next step in this research domain is to integrate the relational perspective (strength of ties) and the structural perspective (actor's position) to study network phenomena in consumer behavior.

Future studies should be devoted to extending our research by examining a different sample or group to improve the generalizability of the results. One of the fascinating ways in which researchers could extend this study is by examining online social network communities (Kozinets, 2002). Currently, the literature on online communities has largely ignored the interplay of social networks and interactions with these communities (Van Den Bulte & Wuys, 2007). As peer-to-peer consumer virtual networks (e.g., Facebook) and computer mediated communication continues to grow (Schlosser, 2009), this issue of understanding the flow of influence in a virtual context is gaining in importance and relevance for both consumers and marketers. Therefore, it would be fruitful to examine how centrality plays a role in these online communities not only to improve the generalizability of the results, but also to explain the phenomena behind network structures and an individual's involvement in off and online communities.

Recent research has also shown that in group settings, the degree of WOM behavior in which one engages depends on the strength of ties that members have with each other (Ryu & Han, 2009). Future research could also extend this framework longitudinally to capture the development of networks, and how a change in the composition of ties and structures over time affects WOM behavior, as well as other social and marketing variables. The use of a social network methodology can assist marketers in identifying the key figures they could convey their ideas to, and in turn, reap the benefits of positive WOM as they diffuse those ideas to the rest of the network. Additionally, the results from our study could also be extended to lend further insights into issues beyond the consumer behavior discipline. Our findings, which include highlighting important features about centrality and showing the differential effects of the individual's perception versus others' perceptions, could have ramifications in the political realm, business organizations, and

even in academic communities. While our focus was strictly on consumers, future research can devote to exploring these relationships in other research domains.

Concluding, we extend the field's knowledge by demonstrating how network centrality plays a role in the consumer's degree of influence on other consumers, and others' influence on a consumer. We find that being central in a network is one of the ways in which people can diffuse information into the network. Understanding that centrality is also associated with susceptibility to influence (that is, that the group influences the central actor too), researchers and marketers can utilize this information to predict adoption behaviors of individuals in the network.

Acknowledgments

The authors would like to acknowledge the helpful assistance provided by Israr Qureshi on previous drafts of this manuscript.

References

- Achrol, R. S. (1996). Changes in the theory of interorganizational relations in marketing: Toward a network paradigm. *Journal of the Academy of Marketing Science*, 25, 56–71.
- Baldwin, T. T., Bedell, M. D., & Johnson, J. L. (1997). The social fabric of a team-based MBA program: Network effects on student satisfaction and performance. *Academy of Management Journal*, 40, 1369–1397.
- Bearden, W. O., Netemeyer, R. G., & Teel, J. E. (1989). Measurement of consumer susceptibility to interpersonal influence. *Journal of Consumer Research*, 15, 473–481.
- Bonacich, P. (1987). Power and centrality: A family of measures. *American Journal of Sociology*, 92, 1170–1182.
- Borgatti, S. P. (2006). Identifying set of key players in a social network. *Computational & Mathematical Organization Theory*, 12, 21–34.
- Borgatti, S. P., Everett, M. G., & Freeman, L. C. (2007). *UCINET for Windows: Software for social network analysis*. Harvard, MA: Analytic Technologies.
- Brass, D. J., & Burkhardt, M. E. (1993). Potential power and power use: An investigation of structure and behavior. *Academy of Management Journal*, 36, 441–470.
- Brown, J. J., & Reingen, P. H. (1987). Social ties and word-of-mouth referral behavior. *Journal of Consumer Research*, 14, 350–362.
- Burt, R. S. (1992). *Structural holes: The social structure of competition*. Cambridge, MA: Harvard University Press.
- Burt, R. S. (1999). The social capital of opinion leaders. *The ANNALS of the American Academy of Political and Social Science*, 566, 37–54.
- Burt, R. S. (2000). The network structure of social capital. *Research in Organizational Behavior*, 22, 345–423.
- Burt, R. S. (2004). Structural holes and good ideas. *American Journal of Sociology*, 110, 349–399.
- Burt, R. S., & Minor, M. J. (1983). *Applied network analysis: A methodological introduction*. Beverly Hills, CA: Sage Publications.
- Carley, K., & Krackhardt, D. (1996). Cognitive inconsistencies and non-symmetric friendship. *Social Networks*, 18, 1–27.
- Childers, T. L. (1986). Assessment of the psychometric properties of an opinion leadership scale. *Journal of Marketing Research*, 23, 184–188.
- Coleman, J. S. (1988). Social capital in the creation of human capital. *American Journal of Sociology*, 94, 95–120.
- Constant, D., Sproull, L., & Kiesler, S. (1996). The kindness of strangers: The usefulness of electronic weak ties for technical advice. *Organization Science*, 7, 119–135.
- Deutsch, M., & Gerrard, H. B. (1955). A study of normative and informational influence upon individual judgment. *Journal of Abnormal and Social Psychology*, 51, 629–636.
- Faust, K. (1997). Centrality in affiliation networks. *Social Networks*, 19, 157–191.

- Flynn, L. R., Goldsmith, R. E., & Eastman, J. K. (1996). Opinion leaders and opinion seekers: Two new measurement scales. *Journal of the Academy of Marketing Science*, 24, 137–147.
- Flynn, L. R., & Goldsmith, R. E. (1999). A short, reliable measure of subjective knowledge. *Journal of Business Research*, 46, 57–66.
- Freeman, L. C. (1979). Centrality in social networks: Conceptual clarification. *Social Networks*, 1, 215–239.
- Gatignon, H., & Robertson, T. S. (1985). A propositional inventory for new diffusion research. *Journal of Consumer Research*, 11, 849–867.
- Gibbons, D., & Olk, P. M. (2003). Individual and structural origins of friendship and social position among professionals. *Journal of Personality and Social Psychology*, 84, 340–351.
- Granovetter, M. (1973). The strength of weak ties. *American Journal of Sociology*, 78, 1360–1380.
- Iacobucci, D., & Hopkins, N. (1992). Modeling dyadic interactions and networks in marketing. *Journal of Marketing Research*, 29, 5–17.
- Jussim, L. (1991). Social perception and social reality: A reflection-construction model. *Psychological Review*, 98, 54–73.
- Katz, E. (1957). The two-step flow of communication: An up-to-date report on an hypothesis. *The Public Opinion Quarterly*, 21, 61–78.
- Katz, E., & Lazarsfeld, P. F. (1955). *Personal influence: The part played by people in the flow of mass communications*. Glencoe, IL: Free Press.
- King, C. W., & Summers, J. O. (1970). Overlap of opinion leadership across consumer product categories. *Journal of Marketing Research*, 7, 43–50.
- Kozinets, R. V. (2002). The field behind the screen: Using netnography for marketing research in online communities. *Journal of Marketing Research*, 39, 69–72.
- Krackhardt, D. (1993). MRQAP: Analytic versus permutation solutions. Pittsburgh, PA: Carnegie Mellon University.
- Mehra, A., Kilduff, M., & Brass, D. J. (1998). At the margins: A distinctiveness approach to the social identity and social networks of underrepresented groups. *Academy of Management Journal*, 41, 441–452.
- Mehra, A., Kilduff, M., & Brass, D. J. (2001). The social networks of high and low self-monitors: Implications for workplace performance. *Administrative Science Quarterly*, 46, 121–146.
- Oyserman, D. (2009). Identity-based motivation: Implication for action-readiness, procedural readiness, and consumer behavior. *Journal of Consumer Psychology*, 19, 250–260.
- Reingen, P. H., Foster, B. L., Brown, J. J., & Seidman, S. B. (1984). Brand congruence in interpersonal relations: A social network analysis. *Journal of Consumer Research*, 11, 771–783.
- Reingen, P. H., & Kernan, J. B. (1986). Analysis of referral networks in marketing: Methods and illustration. *Journal of Marketing Research*, 23, 370–378.
- Ryu, G., & Han, J. K. (2009). Word-of-mouth transmission in settings with multiple opinions: The impact of other opinions on WOM likelihood and valence. *Journal of Consumer Psychology*, 19, 403–415.
- Scott, J. (2000). *Social network analysis: A handbook*. London, UK: Sage Publications.
- Schlosser, A. E. (2009). The effect of computer-mediated communication on conformity vs. nonconformity: An impression management perspective. *Journal of Consumer Psychology*, 19, 374–388.
- Sirsi, A. K., Ward, J. C., & Reingen, P. H. (1996). Microcultural analysis of variation in sharing of causal reasoning about behavior. *Journal of Consumer Research*, 22, 345.
- Steenkamp, J.-B., & van Trijp, H. C. M. (1991). The use of Lisrel in validating marketing constructs. *International Journal of Research in Marketing*, 8, 283–299.
- Van Den Bulte, C., & Wuyts, S. (2007). *Social networks and marketing*. Cambridge, MA: Marketing Science Institute.
- Ward, J. C., & Reingen, P. H. (1990). Sociocognitive analysis of group decision making among consumers. *Journal of Consumer Research*, 17, 245–262.
- Wasserman, S., & Faust, K. (1994). *Social network analysis: Methods and applications*. Cambridge, MA: Cambridge University Press.
- Webster, C. M., & Morrison, P. D. (2004). Network analysis in marketing. *Australian Marketing Journal*, 12, 8–18.
- Yoon, C., Cole, C. A., & Lee, M. P. (2009). Consumer decision making and aging: Current knowledge and future directions. *Journal of Consumer Psychology*, 19, 2–16.