THE ROLE OF SOCIAL STATUS IN NEGATIVE TIE FORMATION

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ABSTRACT

This paper explores the question of how social status influences negative tie formation. Although previous literature in network scholarship has identified the role of social status in tie formation, it has mainly focused on the presence and the absence of positive ties such as friendship and exchange partnership as outcomes. However, another possible significant outcome has been neglected, namely the creation of negative ties. This relative neglect of negative ties has limited the understanding of status claims and network dynamics. In the current paper, I develop and test sets of competing possibilities about the role of status in the formation of negative ties. In using original 56 distinct social networks with negative tie data, I find that social status plays an important role in negative tie formation. In particular, I find that negative ties occur disproportionately from individuals of higher status and are directed towards individuals of lower status. The theoretical implications of these findings are discussed.

BIOGRAPHICAL SKETCH

Yisook Lim is currently in her 2nd year of MS/Ph.D program in the Department of Organizational Behavior of ILR School, at Cornell University. She graduated with dual Bachelor of ARTS degrees in Sociology, and French Language and Literature from Yonsei University in Korea. Ms. Lim also graduated at Yonsei with a Master of ARTS degree in Sociology in the sub-field of research in Organizational Sociology. She began graduate studies in Organizational Behavior in the ILR School at Cornell University in fall, 2012. She has pursued her research in organizational theory/behavior and social networks under the direction of Professors Brian Rubineau and M. Diane Burton.

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THE ROLE OF SOCIAL STATUS IN NEGATIVE TIE FORMATION

CHAPTER1: INTRODUCTION

Does social status influence the formation of negative ties? Podolny and Lynn (2009) show how social status shapes an individual's action by introducing the first scene of the opera *Margaret Garner*. In her engagement party, Caroline – the daughter of a Kentucky plantation owner – shows deference in public to her slave, Margaret, who has cared for and loved her for her entire life. However, the guests – mostly local elites – are shocked and immediately leave the party, and her father is also enraged. This incident not only lowers Caroline's status, but also jeopardizes the family's status and even that of the guests with whom she has associated in the local community. Even though this story is a dramatic illustration of how network affects status dynamics, a key outcome is overlooked: the creation of negative ties. Guests who occupy high status shunned Caroline and her family when their status was threatened by her deference to the slave. They were afraid of a possible lowering of their own status and actively avoided the family in response to this status threat. To purposefully shun or avoid someone includes negativity and is distinct from merely lacking positive relationships. Although status is possibly influential in the negative tie formation between individuals, as shown in the story above, negative ties have been under-theorized and under-researched in the social network scholarship compared to positive ties (Labianca and Brass, 2006). Based on this oversight, I investigate how social status influences the negative tie formation, and contribute to integrate negative ties into empirical social network research.

Despite the lack of consensus on the precise definition of social status used in previous literature, the term is intuitively understood as the rank or position within a social hierarchy that stems from accumulated behaviors of influence and deference (Goode, 1978; Sauder, Lynn and Podolny, 2012; Whyte, 1943). Since social status is based on others' deference and evaluation rather than personal direct material resources or power (Berger et al., 1977), it has been studied at the social relational level (Ridgeway, 2014). To be specific, social scientists have considered status as actors' expectation about not only their own social structural positions but also those of other people (Berger et al., 1977). While numerous sociological studies shed light on socio-demographic characteristics or social categories–race, gender, age, education, or occupation – as status positions, social network researchers focus more on the network properties such as actors' network positions (Bonacich, 1987; Friedkin, 1993): this is because a core-periphery pattern among actors in a network illustrates well status-ordering within a social hierarchy. Also, the network approach can effectively capture a social relational feature of status in the sense that actors' resources and behaviors stemming from status are embedded in one's direct and indirect ties (Lin, 1999). Accordingly, social network scholarship has developed and elaborated on the perspective to understand the nature of social status and status hierarchies in a prominent way. Previous literature in network scholarship has considered social status as a structure to constrain or guide an individual's actions (Mayhew, 1980; Blau, 1977). To be more specific, it has examined how status affects a tie formation between actors and how network formation produces status attainment and related outcomes (Baum and Oliver, 1991; Carley and Krackhardt, 1996; Granovetter, 2005; Podolny, 2001). For instance, since an actor's status is intrinsically connected to the status of his/her associates (Podolny, 2001), s/he attempts to create positive ties with others who occupy higher status. And alliances with high status others often lead to increase in

his/her own status because these relations are viewed as positive signal of quality (Podolny, 2005). In this regard, prior research has focused on the role of status in the presence and the absence of positive relationships such as friendship, partnership, and trust (Bukowski and Newcomb, 1984; McPherson and Smith-Lovin, 1987; Podolny, 1993; Podolny and Phillips, 1996) between actors from individuals to organizations. However, it has largely ignored another important outcome of status claims: negative ties.

Early social network scholarship examined both positive and negative relationships and recognized the importance of negative ties in social relations (Heider 1958; Thibaut and Kelley, 1959; White, 1961). However, as already noted, modern social network scholarship has left negative relationships underexplored. Therefore, the definition and taxonomy of negative ties are not established. In this paper, I base the analysis on a negative tie as measured by having difficulties in getting along, using original dataset of 56 networks. Although this measure depicts a specific aspect of the possible broad range of negative ties, I provide empirical evidence using an original data to explore this important but overlooked part in the literature of status and networks in general. The integration and synthesis of both positive and negative networks would undoubtedly provide substantial new insights in order to understand social status dynamics

CHAPTER 2: SOCIAL STATUS AND NEGATIVE TIES

Social status is one of the most fundamental relational dimensions of social interaction between individuals at the micro level (Kemper and Collins, 1990). Thus, social status has been considered an important constraint to the shaping of interpersonal relationships. As noted, numerous social network studies have found that social status plays a critical role in the creation of positive relationships between actors. However, despite its importance, its role in negative interpersonal relationships has not received attention in the literature. More recently, Labianca

and Brass (2006) point out the importance of negative ties in understanding complete social networks, and suggest theoretical propositions of both the antecedents and consequences of negative ties in organizations. However, with this notable exception, there are insufficient theoretical and empirical findings in this area of research.

The negative tie that I describe in this study is one that includes "dislike" or "discomfort" feelings or judgments towards others when socializing, regardless of whether they are manifested or concealed. This type of negative tie is distinct from both the positive tie that implies "like" feelings and from the null tie that refers to no relations. Although the negative tie has been under-researched in social network scholarship, it is notable that Burt (2005) distinguishes negative relations from positive ones by analyzing the social network of bankers; negative relations imply difficult relationships, distrust, and emotional distance in job responsibilities.[1] His definition is based on co-workers' negative evaluations toward each other in the work organization, but provides insights into what negative ties represent in the current study.

Since I explore an emerging area of research, I derive all the plausible possibilities from a small but growing number of theoretical and empirical studies alike (Faris & Felmlee, 2011; Gould 2002, 2003). These possibilities are diverse and even competing to each other because this host of studies is not only based on different approaches but also shows contradicting results. Also, I state these possibilities using two analytic standards: the tie direction and the tie strength. First, I consider negative ties as directional ones. While friendship has been assumed to be undirected or reciprocal–the tendency for A to like B when B likes A–in the majority of empirical research in social network studies, I cannot assume that negative ties have the same

[1] The definition of negative ties of social exchange scholars (Emerson, 1972) is different from Burt's and my description. They focus more on the structure of resource dependence and power in exchange relations. For instance, in two exchange relations between A-B and A-C, if B and C are substitutable as alternative exchange partners for A, the relationship between B and C is negative.

tendency since its generalized understanding is not developed. Directed ties allow me to discover whether higher status actors dislike lower status actors or vice versa. Second, I hypothesize competing possibilities based on the difference in the tie strength. The "dislike" feelings may be moderate or intense in strength. Although the data is based on a weak type of negative ties, I create possibilities based not only on weak but also strong types of negative ties, such as conflict, in order to offer rigorous empirical evidence.

Furthermore, social status can differentially influence negative tie formation at multiple levels: the individual and dyadic levels. By testing the possibilities at both levels, I can scrutinize the effects of social status as critical mechanisms of negative tie-generating processes. The associations between social status and negative tie formation at both levels are shown in Figure 1. At first, an individual's social status is probably associated with the probabilities of generating or receiving negative ties at the individual level. In the first type of individual level effect, *high status generator,* an individual who occupies higher status, is more likely to generate negative ties toward others. And *low status generator* is the opposite. On the other hand, *high status recipient* means that a higher status person is more likely to receive negative ties from others, while *low status recipient* is the opposite. All four possibilities can be tested by two correlation estimates between social status and outdegree– the number of ties that the focal ego directs to others – and between status and indegree- the number of ties directed to the focal ego from others.

Meanwhile, at the dyadic level, status similarity or dissimilarity between two persons may breed negative relationships, as in the case of *homophily* or *heterophily* (McPherson, Smith-Lovin, and Cook 2001) in positive relationships. Status homophily in a negative relationship suggests that negative ties may be more likely to occur when social status between two individuals is similar. As shown in Figure 1, there are two cases in *status homophily*: between

highs and between lows. These two types of status homophily can be tested by one estimate that is calculated as the absolute difference between ego's status and alter's status. On the other hand, *status heterophily* in negative tie formation denotes that a negative relationship between two people dissimilar in social status occurs at a higher rate than between similar people. Considering the tie direction, in the case of status heterophily, two possibilities exist: negative ties can be generated from individuals with higher status toward ones with lower status – *from high to low* –, or vice versa –*from low to high*.

2.1: High Status Generator, Low Status Recipient & From High to Low

According to one of the core arguments in network scholarship that examine the relationship between social status and positive ties, a person's social status is influenced by the status of others with whom s/he is associated. In other words, those who have relationship with high-status others are positively evaluated, while those who make ties with low-status others are penalized (Blau, 1964; Podolny, 1993; Bothner et al, 2012). Podolny (2001) terms this *status leakage*; he argues that status spills over from one to the other through the interpersonal positive relationship. For example, when high-status actors have ties with low-status others, their status would decrease while low-status actors would experience an increase. With respect to status leakage, status serves as a signal of quality to third parties especially in situations of high uncertainty (Podolny, 2005). Status may be an informational cue used to evaluate the underlying quality of actors when quality differences are ambiguous (Sauder, Lynn and Podolny, 2012).

Although the majority of empirical studies related to the argument have been conducted at the organizational level with a specific focus on exchange relations, this construct can be applied in the relationships between individuals within organizations. The status of the high status person may transfer to other members or subordinates with whom s/he associates. For a

low status person, positive ties with high status others work as endorsements to increase his/her status with third parties whereas a high status person can be penalized by making positive ties with a low status person.

Then, might social status also be associated with generating or receiving negative ties? One strand of research suggests that negative ties tend to be initiated from higher status actors, and target lower status actors. Labianca and Brass (2006) propose that lower status individuals would be more likely to receive negative ties and that higher status individuals would be less likely to receive them. They identify the individual motive to form negative ties to lower status actors; in other words, they describe potential social benefits of having negative ties with more commonly disliked organizational members. Negative ties with people generally disliked by others may actually increase one's reputation, while negative ties to others who are well-liked may potentially incur reputational costs. These propositions are consistent with the fluidity of status hierarchy (Moody and White, 2003; Podolny and Lynn, 2009). Social status is not a fixed but rather a fluid characteristic so that individuals make sustained efforts not to decrease but instead to increase or to maintain it. Differentiation from marginalized persons can display his/her superiority and strengthen current status. Although most studies focus on the formation of a positive tie as a way to status attainment, to generate a negative tie might be an alternative strategy to maintain status.

In a similar vein, past research finds that higher status people are more likely to exclude lower status others in an effort to signal and strengthen their status. Bryson (1996) examined the cultural tastes of people and concluded that higher status people exclude lower status cultural cues; for example, people are more likely to dislike musical genres whose fans are unevenly non-White and less-educated-gospel, country, rap, and heavy metal. People use cultural taste as a

status signal to exclude lower others and to reinforce their symbolic boundaries (Bourdieu, 1984). Likewise, Edgell, Gerteis & Hartmann (2006) demonstrated that atheists are less likely to be accepted in both public and private life than any other minority groups because people consider religious beliefs as moral solidarity and cultural membership. Having religion is not a mere religious affiliation per se, but a formation of symbolic boundary that distinguishes insiders from outsiders. This pair of studies is consistent with the idea that the formation of negative ties is a form of status work. That is, individuals are likely to form negative ties to lower status individuals or entities as a way to make claims about or perform maintenance on their own status. Thus, negative ties are a tool for group boundary maintenance and identification (Sherif et al. 1961). Those who create negative ties with lower status others distance themselves from being members of a lower status group.

I propose the following hypotheses about the association between social status and the generation and receipt of negative ties at the individual level.

H1a (High Status Generator): Higher status individuals are more likely to be the generators of negative ties.

H1b (Low Status Recipient): Lower status individuals are more likely to be the recipients of negative ties.

These hypotheses suggest not only the presence of a mechanism at the individual level, but also a dyadic mechanism. Negative ties are not merely more likely to be generated by higher status individuals. Similarly, negative ties are not merely more likely to be received by lower status individuals. Rather, negative ties are likely to go from individuals of higher status and to individuals of lower status.

More recently in online social network scholarship, a set of studies using large social media-type datasets including indicators of positive and negative ties has found evidence for this regularity. Leskovec, Huttenlocher and Kleinberg (2010a) found evidence that while positive directed ties indicate that the recipient is considered to have higher status than the creator, negative directed ties indicate that the creator views the recipient as having lower status than her/himself. In a follow-up study, these scholars found that tie formation based on this kind of status ordering is consistent on a global level in online network datasets from Epinions, Slashdot and the Wikipedia election network (2010b). This result is further supported by the study of Maniu, Cautis, and Abdessalem (2011) which used the network data of the WikiSigned, a collection of the revision history of users on articles from Wikipedia including votes for adminship, the restoring and acknowledging of an article. These findings are likely to be conservative, given the evidence that online network data tends to underestimate the effects of status-relevant social hierarchies, boundaries, and categories such as gender and tenure (Johnson, Kovács, and Vicsek 2012).

All in all, these findings suggest the following hypothesis at the dyadic level.

H1c (Status Heterophily I: From High To Low): Negative ties are more likely to be directed from higher status individuals to lower status individuals between pairs of individuals.

2.2: Low Status Generator, High Status Recipient & From Low To High

On the other hand, there is another set of theoretical and empirical scholarship that presents a competing perspective. In proposing the opposite of the first set of hypotheses, this perspective expects that negative ties are generated more frequently from lower status individuals to higher status individuals. For example, in his work on the origin of status

hierarchies, Gould (2002) developed and theorized a general model of status hierarchy from assumptions about how individuals form attachments to each other. According to this theory, high-status actors are more likely to be the targets of attachment attempts by other actors, simply because they are a smaller group sought after by many others. Because of this inequality in numbers, however, many of these attachment attempts cannot be reciprocated. Speculating upon Gould's explicit articulation of his theory, I suggest that, when attempts to affiliate with higher status people fail, lower status people may react to this lack of reciprocation by creating a negative tie. In this manner, unreciprocated positive ties can lead to the "sour grapes" feeling, and therefore can be the source of new negative ties.

The network exchange theory also offers a distinct mechanism that entails expectations to those from Gould's status hierarchy theory. Lovaglia (1995) finds that an exchange with a powerful person induces strong negative emotions among lower-status participants. This is to say that, to the extent that higher status individuals have greater power over the outcomes of lower status individuals, then lower status individuals may resent that power. In a similar vein, experimental studies in network exchange theory also show that actors with low-power report significant negative reactions and emotions whereas high-power actors report positive emotional reactions to their low-power partners (Lovaglia and Houser, 1996; Willer, Lovaglia, and Markovsky, 1997). These theoretical and empirical arguments yield competing hypotheses to the previous ones:

H2a (Low Status Generator): Lower status individuals are more likely to be the generators of negative ties.

H2b (High Status Recipient): Higher status individuals are more likely to be the recipients of negative ties.

Also, these hypotheses suggest a dyadic mechanism as well as an individual mechanism. Negative ties are likely to be initiated from individuals of lower status to individuals of higher status between pairs of individuals.

> *H2c (Status Heterophily II: From Low To High): Negative ties are more likely to be directed from lower status individuals to higher status individuals between pairs of individuals.*

2.3: Status Ambiguity: Status Homophily

Both sets of hypotheses assume the variability of generating or receiving negative ties depending on the ego's status at the individual level and status dissimilarity or heterophily between pairs of individuals who form negative relationships, although they differ in the direction of negative tie formation. Conversely, as previously noted, a distinct scholarship suggests that status similarity, or status homophily, may be a potentially important mechanism in the genesis of negative ties.

In his book, *Collision of Wills – How Ambiguity about Social Rank Breeds Conflict*, Gould (2003) argues that conflict between individuals is more likely to occur when their social statuses are similar and their relative social ranks are unclear and ambiguous. Although I bring Gould's status hierarchy theory to suggest competing hypothesis of status heterophily above, *Collision of Wills* is about conflict – a particular type of negative ties – rather than status. According to Gould (2003), when individuals are similar in status, which individual has higher status is ambiguous. And it is this ambiguity in ranks between individuals in symmetrical or reciprocal social relations – rather than individuals within established asymmetric or hierarchical relations – that often leads to interpersonal conflict. Disputes are more likely to emerge in conditions of symmetric relations, since social ranks are not clearly determined, and individuals

are prone to disagree about their rank. Conflict can be a result of this ambiguity, or perhaps a tool to resolve it. The idea that conflict – and in particular, expressions of interpersonally directed anger – may be a way to claim social status has been supported in experimental studies. For example, Tiedens (2001) evidenced that more status was conferred on people who expressed anger than on those who expressed sadness. While conflict is not identical to negative ties, its construct more or less involves negative relationships between individuals during social interaction. Accordingly, I speculate from Gould's theory and hypothesize that greater status similarity, not greater status difference, can prompt the formation of negative ties

> *H3 (Status Homophily): Negative ties are more likely to be formed between individuals with similar statuses.*

CHAPTER 3: METHODS

3.1: Data

The data used in this paper were collected in 2008, 2010, 2011 and 2012 from students of a residential fellowship program across 14 separate large universities predominantly located in the Midwest of the United States. The 14 residences for 4 years survey are operationalized into 56 distinct networks. Although these 56 networks are not actually independent, I regard each network as a unit of meta-analysis in cross-sectional setting. This strategy allows obtaining the aggregated effects of social status in negative tie formation from diverse comparable networks so that I obtain more generalizability of possible findings.

Similar to Newcomb's famous dormitory research (1961), students in this fellowship program live together in program-owned dormitories while in college. Since students in these self-contained dormitories engage in many mandatory regular (at least weekly) meetings and social activities, I can examine the dominant, though not exclusive, part of the students' social

milieu. The data were collected from full roster network surveys conducted in the fall semester at each program site for each of the four academic years (2008, 2010, 2011, and 2012). These network surveys were administered over the period from mid-November to early December in each of the four academic years.

In 2008, 753 students participated in this fellowship program, in 2010, 790 students, and in 2011, 766 students participated. Finally, in 2012, 771 students participated. The overall response rate across the four years was over 90%. The mean number of students per site is 53, with a range from 33 to 119.

These students differ from the general population of typical undergraduate students in a couple of notable ways. First, they are more white (>80%) and more male (about three-quarters male). Second, the scholarship is a means-tested program for high school graduates in low-income families; many of them are the first generation in their families able to attend college. Therefore, students' socioeconomic status (SES) is unusually homogeneous and low, relative to that of the general undergraduate population. These respondents are in a specific and non-representative subgroup of college students. This homogeneity among students reduces the role of socio-demographic factors in assigning informal status, and also helps us to examine the social construction of status in a controlled setting.

Although the data come from students rather than a workplace setting, there are some distinct advantages to the empirical setting for my particular research question. Notably, the formal organizational environment encompasses an unusually large fraction of the informal organizational structure through which social influence (and selection) processes across various domains are likely to operate. In addition to living together in a closed, self-governing (but not self-constituting) community, the subjects tend to work together, go to classes together, eat

together, exercise and play sports together, draw romantic partners from amongst each other, etc. These settings in many ways resemble a kind of total institution (Goffman 1961) – precisely the kind of setting where the entanglement of individual and organization is most intimate. The entanglement of status and negative ties may be noisier and more confounded by other processes and social opportunities in less immersive organizations, if there are status effects on negative ties in any social context, I should expect to see such effects here.

3.2: Variables

The dependent variable is whether respondents make a negative tie with others; the network survey asked students to identify alters at their site with whom they have difficulties getting along. (Specifically, the survey prompt was: "Sometimes I do not find it easy to get along with this Scholar.") Although this measure depicts a weaker type of possible diverse negativities, any more negativity risks scholars having insufficient observations for analysis. There might be bias against reporting negative relationships in the survey; already the size of this type of negative ties is about 1/3 to 1/4 of the size of the friendship ties. Students' responses represent their self-reported set of alters for this type of negative relationship.

As the main independent variable, social status is measured as eigenvector centrality (Bonacich, 1972) among friendship ties. This is not only because one's status can be granted by others' attempts to affiliate with him/her but also because status measured among negative ties is difficult to interpret. While actors at the core of the network are the most powerful, those at the periphery are dependent in a society (Marsden & Laumann, 1977). Also, a person who has many ties, but peripheral people is more likely to have lower status than people who have ties with few, but with highly central people. Therefore, measures of status should consider the prestige of alters with which ego has ties as well as the number of ego's ties. Since eigenvector centrality

takes into account not only the focal ego's centrality but also the centrality of alters with which ego has ties, it is a relevant measure of status to use. To measure eigenvector centrality among friendship ties, I asked students to identify alters with whom they consider as close friends. Eigenvector centrality is a commonly-used network-based measure of social status (Bonacich & Lloyd 2001; Bothner et al.; 2010; Podolny 1993; Wasserman & Faust 1994). Another advantage of eigenvector centrality is its demonstrated robustness even in the face of missing network data (Costenbader & Valente 2003).

As controls, I include gender, race (white/non-white), and school year. Gender is a binary variable (1 as female, and 0 as male). Race has originally multiple categories, but is coded as a binary variable (1 as non-white, and 0 as white) because of the racial homogeneity of the setting. Finally, I consider school year with the range from 1 (freshman) to 4 (senior). All controls are coded based on self-reporting.

CHAPTER 4: ANALYSIS

4.1: First-Order Correlation Estimates

The individual-level hypotheses (H1a, H1b, H2a, H2b) about the role of social status can be tested directly simply by correlating social status with individuals' indegree and outdegree (Freeman 1979) in the negative tie network. The Pearson correlation between individuals' social status and negative tie indegree is -0.057; this indicates an association where increases in social status decrease the number of negative ties received. However, all observations for the 4-year survey are not independent so that I cannot use the significance test. It would be more justifiable to use 4 year-specific correlations of about 750 observations each. The correlation estimates between social status and indegree are -0.076 ($p=0.03$) in 2008, -0.082 ($p=0.02$) in 2010, -0.038 ($p=0.29$) in 2011, and -0.059 ($p=0.10$) in 2012. Although the correlations in 2011 and 2012 are

either not significant or only marginal, all estimates show the same tendency that when individuals' social status increases, the probability to receive negative ties decreases. Similarly, decreasing social status marginally increases the number of negative ties received. These correlations marginally support hypothesis H1b (low status victimization) while challenging H2b (high status apathy). The Pearson correlation between individuals' social status and negative tie outdegree is 0.113 in total. And the year-specific correlations are 0.099 (p=0.006) in 2008, 0.121 (p=0.001) in 2010, 0.105 (p=0.004) in 2011 and 0.123 (p=0.001), again an association where increases in social status increase the number of negative ties reported, and decreases social status decrease the number of negative ties reported. These correlations provide strong support for hypothesis H1a, while falsifying H2a. And all in all, both sets of correlations are consistent with the directional hypothesis at the dyadic level, H1c (from high to low) while challenging H2c (from low to high).

In addition to testing the individual-level hypotheses, I can use correlations to test some of the relational hypotheses. The homophily implication of Gould's (2003) status ambiguity theory of conflict (H3) can be tested by correlating the negative tie network with the *dissimilarity matrix* of individual status. The status dissimilarity matrix for a group of N people is the N x N matrix where the *i,j* matrix entry is the absolute value of the difference between the status of individual i and the status of individual *j*. A positive correlation indicates that negative ties are more common among individuals with larger status differences – that is, evidence for status heterophily in negative ties. A negative correlation indicates that negative ties are more common among individual with smaller status differences – that is, evidence for status homophily in negative ties. Since this correlation is at the network level rather than the individual level, the data with 56 distinct networks yields 56 distinct correlations. The mean correlation between the

negative tie networks and their corresponding status dissimilarity matrices is 0.013. Of the 56 correlation coefficients, 37 are positive and 19 are negative. This distribution provides significant support for a positive correlation based upon a simple sign test. These correlation results provide support for a status dissimilarity effect (supporting H1c and H2c without distinction) over a status homophily effect (challenging H3).

Beyond status homophily or heterophily in negative ties, the directional hypotheses at the dyadic level – that negative ties will be disproportionately directed from people of higher status towards people of lower status (H1c), or vice versa (H2c) – can also be examined via network correlations. Evaluating these directional hypotheses requires using the correlation between the negative tie network and the *difference matrix*. The difference matrix is like the dissimilarity matrix, but the raw difference, with resulting positive and negative signs, is used rather than the absolute value of the same. A positive difference in the status difference matrix means that individual *i* is of higher status than individual *j*, and vice versa. A positive correlation between the negative tie network and this status difference matrix means that negative ties are more likely to be reported by people of higher status towards people of lower status. A negative correlation indicates that negative ties are more likely to be reported by people of lower status towards people of higher status. The mean correlation across the 56 networks is 0.049. Of the 56 correlations, 48 are positive and 8 are negative. A simple sign test shows that I would observe this number of positive correlations less than 1% of the time if the correlation were really zero and positive and negative coefficients appeared with equal probability. This evidence in support of a positive correlation suggests a directional tendency where negative ties are more frequently reported by higher status individuals towards lower status individuals (this supports H1c and challenges H2c).

4.2: Simultaneous Estimation using MRQAP

These initial findings regarding the role of status in negative tie formation are first order effects. Because individual and relational processes interact simultaneously, it would be good to test for each while controlling for the other. I can achieve this with social network statistical estimation techniques that allow both individual and relational characteristics in the same estimation model. I utilize MRQAP (multiple regression quadratic assignment procedure) supplemented by meta-analysis to analyze the dataset of 56 social networks from a 4-year survey. MRQAP is regression for network data that resolves the non-independence problem of observations (Krackhardt, 1988). MRQAP allows simultaneous estimation of both individual and relational factors associated with network tie formation[2]. Another advantage of MRQAP is the availability to control for all network structural effects. While numerous studies have accumulated stable measures of network characteristics related to positive tie networks, none of the corresponding measures exists in negative tie networks. As estimates of homophily and heterophily can be biased when not controlling for structural effects (Goodreau, Kitts, & Morris 2009), it is appropriate to utilize MRQAP. Each MRQAP estimates the parameters of the specified model for a single network. I therefore estimate the same model for each of the 56 networks, and use meta-analysis to evaluate the aggregated results across these estimates.

I construct these models to explicitly test the role of ego's status, alter's status to examine individual level processes. Also I include the absolute difference in magnitude between the two to test status homophily in the creation of negative ties. The directional difference between ego's status and alter's status can be evaluated by the raw difference between the two, and I modify if

[2] I could also use exponential random graph model (ERGM). However, because there is little theory about network structure of negative tie networks that may strongly affect the tie formation, we cannot include specific terms of structural effects in ERGM. Actually, the term of triadic closure in ergms makes the models fit poorly to the data. Thus, I decide to use MRQAP that controls for all structural effects.

ego's status is higher than alter's, then 1, if ego's status is lower than alter's, then -1, and if both are equal, then 0. As noted, I include ego's gender, race (white/non-white), and school year as controls. Also, the differences in gender, race, and school year between ego and alter are controlled for.

Although I have a single model specification for the MRQAP, I estimate the model 56 times; once for each network. I use Stouffer's method of combining Z-scores across these sets of 56 estimates. The homogeneity across the studies justifies the use of this simple meta-analytic method (Bangert-Drowns 1986). In addition to the meta-analytic Z-score, which is the main test of both the significance and direction (as the sign of the estimated effect is preserved) of the estimated effects, I also present the failsafe-N and the mean point-estimate for each parameter. The failsafe N is the number of additional studies (here, distinct networks) with a zero effect estimate for the focal parameter that would need to be added to the meta-analysis to make a significant finding drop below the alpha=0.05 significance threshold. Higher values of this failsafe-N mean greater confidence in the robustness of my significant findings.

CHAPTER 5: FINDINGS

The results of the MRQAP analyses and the meta-analysis across them are presented in Table 1. At the individual level, I find strong support for the idea that an individual's status by itself is positively associated with the likelihood of generating a negative tie (supporting H1a and challenging H2a). Although alter's status shows no association with receiving negative ties, the mean coefficient is negative. And I also find significant and strongly robust evidence for the directional effect that negative ties more commonly go from a higher status individual to a lower status individual between pairs of individuals (supporting H1c and contradicting H2c). However, I do not find the status homophily process in negative tie formation. Taken together, I find

negative ties tend to be a directional phenomenon, going from individuals with higher status to individuals with lower status. This tendency results in a mild but significant status heterophily or status dissimilarity effect on negative ties. Social status clearly plays an important role in the formation of negative ties by ordering those ties from higher status individuals to lower status individuals. This pattern was repeated significantly and robustly in analyses aggregated over 56 distinct networks.

Among the control variables, difference in school year between ego and alter shows a negative and significant coefficient. This means that negative ties are more common between pairs of a similar school year. Also, gender difference has a negative and significant effect on the negative tie formation. Although this effect is not robust, I find that negative ties are more common in between dyads of same gender. Difference in race between pairs has a positive effect on tie formation, but is not statistically significant. Also, the coefficient for an individual's gender, race, and school year are not significant.

One of the plausible concerns is that the finding is possibly biased by the size of the network. If a few sites having a larger number of negative ties than other sites may drive this directional phenomenon. This concern can be resolved by simply comparing the MRQAP results of bigger and smaller sites using median (=55) split. Figure 2 summarizes the size of negative tie network and the number of negative ties across the 56 sites. Also, the Pearson correlation between the number of negative ties and network size is $0.61 (p<0.001)$, which means that the bigger the site, the more negative ties. However, both bigger sites and smaller sites show same directional effect in negative tie formation. Thus, I can confirm that the finding is not driven by network size.

Since these data are taken from network surveys from the same 14 dormitories, the 56 networks are not truly independent. Each dormitory contributes four network observations to the dataset: one in 2008, one in 2010, one in 2011, and one in 2012. There is a reasonable concern that this non-independence could bias the findings. If a few dormitories demonstrated status effects in negative tie formation that were very strong and pervasive across years, these few dormitories would each contribute 4 sets of networks to the dataset; this would potentially support an apparent general effect in the meta-analysis. This concern is based on the assumption that the network observations within the same dormitories over the years are more similar to each other than the network observations of other dormitories. I can easily do a statistical check on whether this concern is likely affecting my analysis. I obtain the MRQAP results of 14 different networks in each year to confirm the robustness of significant coefficients. If the results are not consistent across four years, then this non-independence would need to be addressed by additional controls in the meta-analysis. Should the results be robust across four years, then the non-independence of the network observations is not generating the findings in the meta-analysis. For each of the two status-related terms (ego's status and directional difference), ego effect is significant in 3 of 4 years (2008, 2010, and 2012) and directional difference is also significant in 3 of 4 years (2010, 2011, and 2012). Based on these results, I do not make any additional adjustments to the meta-analysis. Thus, it is confident that the finding that social status plays a role in creating directed negative ties is a true finding, rather than an epiphenomenal one.

CHAPTER 6: DISCUSSION AND CONCLUSION

My analysis shows that social status plays an important role in negative tie formation. Negative ties are reported disproportionately by people of higher status about people of lower status. These findings about the role of status in negative tie formation are more consistent with

the possibility that high status individuals arguably attempt to victimize low status others. As Labianca and Brass (2006) point out, negative ties entail social liabilities, and they were used in part to create and maintain intra-organizational subgroups or hierarchies. The empirical evidence for this argument suggests this topic merits greater theoretical development and further empirical scrutiny. Negative ties could thus be important building blocks in organizations' informal structures, and a more complete understanding of informal structures in organizations requires attention to both positive and negative ties.

Negative ties are also likely to be integrally involved in the construction and maintenance of status. The distinction of high status individuals from low status others is possibly attributed to the desirability to increase or to maintain present status. If so, then exclusive attention to positive ties (e.g., Ball and Newman 2013) will bypass an important facet of the generative dynamics of both status and networks. Importantly, the causal arrow in this relationship cannot be determined from the data. Individuals could gain status by distancing themselves from unpopular and disliked others (i.e., low social status causes the receipt of negative ties), or receiving a negative tie could degrade an individual's social status. Future research is needed to determine the direction of this process, although both may occur simultaneously. Either status or negative ties may be the cause or result each of the other. From the current analysis, I cannot determine whether high status individuals either gain or maintain their status via generating negative ties with lower status individuals. Examining the temporal dynamics of negative networks may help to resolve the direction of these effects.

Furthermore, negative tie dynamics likely differ depending on the specific type of negative tie. Although I describe negative ties as "dislike" feelings or evaluations toward alters when socializing, the type of negative ties may be varied depending on whether they are revealed

or concealed, or whether they are severe or mild: avoidance is mild and concealed, while bullying is severe and revealed. For example, conflict may indeed be characterized by a greater level of reciprocity than the type of negative relationship I studied. In this regard, although H2a, H2b, and H2c (low status dissatisfaction, high status apathy and from low to high) – that lower status individuals are more likely to report negative ties toward higher status others – were not supported, I do not imply that their arguments are incorrect. Rather, I can posit that there are different types of negative ties (Burt, 2005), and future research is needed both to develop an empirically-grounded taxonomy of negative ties, and to provide guidance on how different types of negative ties may be governed by different dynamics in different contexts. Gould's status ambiguity theory was used as the basis for generating H3 (status homophily), which was not supported, but importantly, the findings do not contradict Gould's theory. The finding that negative ties go from higher status individuals to lower status individuals means that the initiator perceives herself or himself as being of higher status than the recipient. If the recipient refuses or disagrees with current status ordering, the recipient may engage in or escalate conflict to reclaim status. This dynamic is wholly consistent with Gould's status ambiguity theory as well as with the findings. The resolution relies on viewing negative ties as status claims and conflicts as the result of disputed status claims. The distinction between conflict-related negative ties and other forms of negative ties may be crucial to understand how Gould's theories relate to negative tie networks.

Similarly, since my study setting is different from exchange networks where exchange theory focuses on, the results may be dissimilar to exchange assumption based on positive tie (Podolny 2010; Willer 1999). In other words, negative ties associated with avoidance behaviors may obviate the opportunity to engage in exchange. For such ties, the copious scholarship about

networks and status based on exchange and positive ties may provide little insight into the effects of negative ties on status. Along similar lines, the findings about the role of status in negative tie formation may differ depending on the type of negative tie, with one set of dynamics in operation for negative ties that prevent exchange, and another in operation for negative ties that still allow exchange. Given that members of the dormitories in my setting are required to participate in weekly meetings for collective governance, it is unlikely that complete avoidance is possible. For this reason, the kind of negative ties I investigate are likely to still allow exchange. The findings may not generalize to other kinds of negative ties.

Moreover the findings about the structural dynamics of negative ties raise questions to be addressed in future research. Although I control for all possible effects of network structure, additional scrutiny into these dynamics is needed. Further research that investigates the dynamics of structural variables such as dyadic reciprocity– the tendency for A to dislike B if B already dislikes A– and triadic closure – the tendency for enemies of friends to become enemies or for friends of enemies to become enemies– is necessary in order to develop an elaborate theory and empirical research.

Also, this investigation of the negative tie formation and the role of social status provides much-needed insights into the under-examined area of network science, while prompting new questions as well. In particular, I demonstrate that network indicators of social status based solely on positive tie networks are likely to be incomplete, since negative tie networks are important for status claims and status maintenance in social settings.

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Figure 1: The Effects of Social Status in Negative Tie Formation at the Individual and the Dyadic Levels.

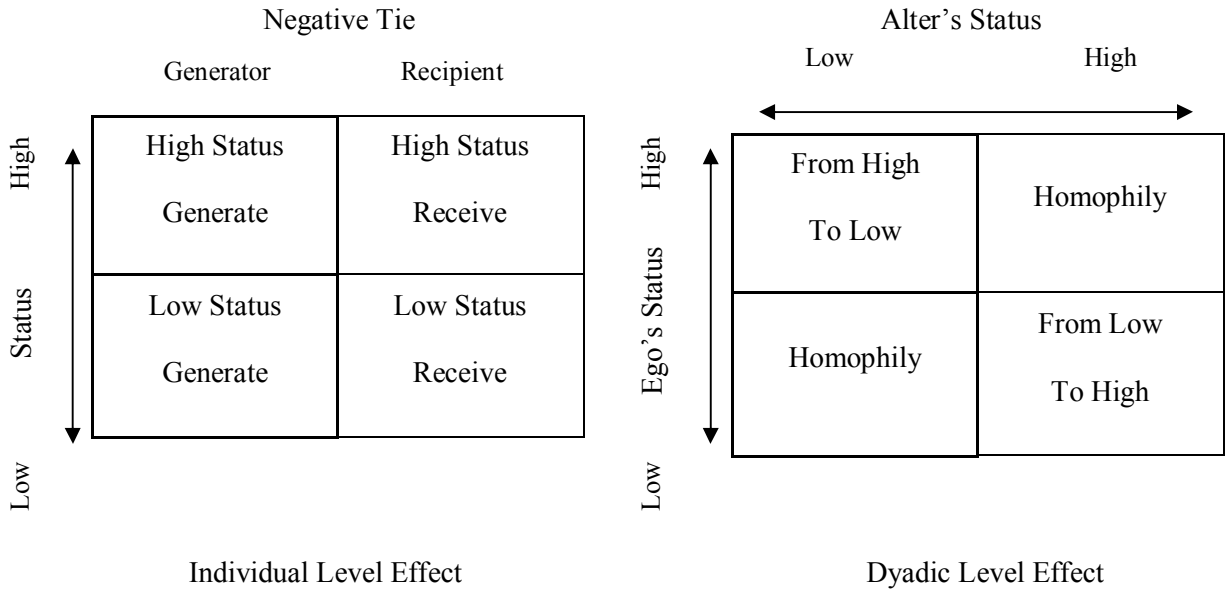

Figure 2: Summary of Negative Tie Network Data across the 56 Sites

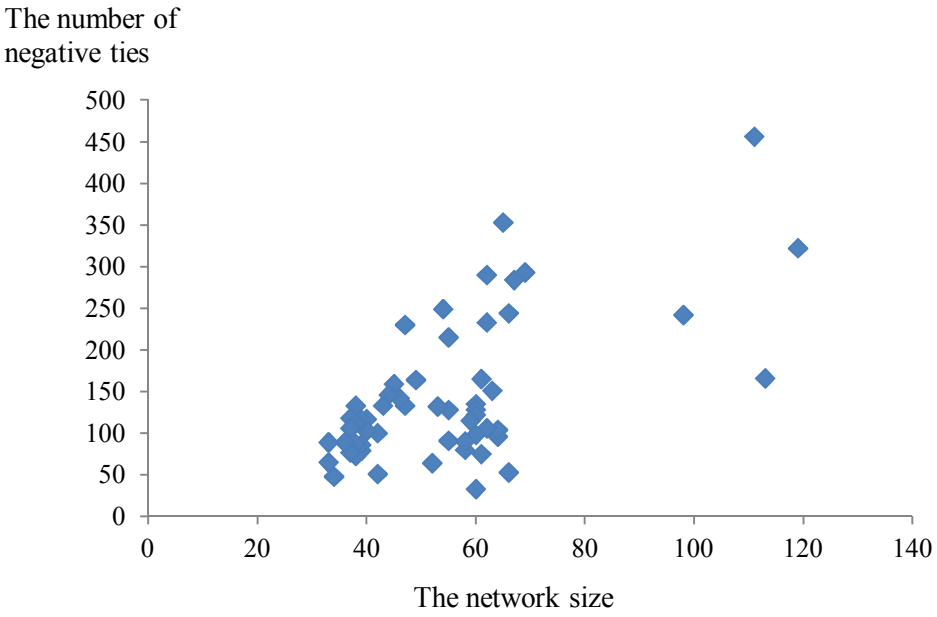

Table 1: Meta-Analysis of Multiple Regression Quadratic Assignment Procedure (MRQAP) Results from 56 Distinct Networks Examining the Role of Status in the Formation of Negative Ties.

	Mean of 56 Coefs.	**Meta-Z (Stouffer's)**	**Failsafe N**
Intercept	0.0555	8.75	1054
Ego's status	0.0741	3.60	130
Alter's status	-0.0468	-1.45	NA
Directional effect	0.0052	4.12	191
Status Homophily	0.0334	1.80	NA
Controls			
White	0.0046	1.35	NA
Race difference	0.0050	1.92	NA
Female	0.0094	1.39	NA
Gender difference	-0.0048	-1.96	1
Sophomore[a]	-0.0062	-1.49	NA
Junior	-0.0044	-0.37	NA
Senior	0.0030	0.17	NA
School year difference	-0.0099	-9.85	1030

[a] The baseline category is freshman

APPENDIX

As mentioned above, I used exponential random graph models (ERGMs) as a research method to identify the relationship between social status and the formation of negative ties between peers within college student organizations. This social network statistical estimation technique allows the simultaneous estimation of both individual and relational factors associated with network tie formation (Robins et al. 2007) in the same way as MRQAP that I eventually employed in the current paper. During the initial analysis, the dataset was composed of 42 social networks–14sites for 3years–because the most recent survey had not been obtained yet. I estimated the same model for each of the 42 networks, and used meta-analysis to evaluate the aggregated results across these estimates. The results using ERGMs are as follows:

Table 2: Meta-Analysis of Exponential Random Graph Model (ERGM) Results from 42 Distinct Networks Examining the Role of Reciprocity, Closure, and Status in the Formation of Negative Ties.

	Mean of 42 Coefs.	**SD of 42 Coefs.**	**Meta-Z (Stouffer's)**	**Failsafe N**
Edges	-3.75	0.53	-126	172860
Reciprocity[a]	0.64	0.82	8.59	729
Closure	1.20	0.43	11.27	1348
Heterophily	0.36	2.58	2.05	5
Ego's Status	1.44	2.85	1.25	NA
Alter's Status	-2.13	2.71	-2.80	44
Ego's Status - Alter's Status (from Wald test)	3.56	3.29	5.65	307

[a] Uses 40, rather than 42 sites. The reciprocity term was dropped for the 2 sites with no reciprocated ties.

As Table 2 illustrates, I included ego's status, alter's status and the absolute distance between the two (status heterophily/homophily) as main independent variables that may affect the negative tie formation. Also I added network structural variables–dyadic reciprocity, triadic closure–to control for structural effects. The directional effect that negative ties are more likely to form from high status ego toward lower status alter was consistent with the main MRQAP results. However, I found unexpected evidence of positive closure among negative ties since negative closure might be more consistent with Balance Theory. More importantly, this closure effect makes the models not fit to the data. However, since network structural factors can bias the effects of status homophily or heterophily, I could not simply remove the closure variable from the models. Therefore, my advisor advised me to try numerous ergms by adding or subtracting variables in an effort to find alternative network structures, but GOF (goodness of fit) statistics showed that all models did not fit the data. Thus, I decided to use MRQAP which controls for all network structural effects as an alternative method.