

University of Groningen

Gossip in organizations

Ellwardt, L.

IMPORTANT NOTE: You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.

Document Version

Publisher's PDF, also known as Version of record

Publication date:
2011

[Link to publication in University of Groningen/UMCG research database](#)

Citation for published version (APA):

Ellwardt, L. (2011). *Gossip in organizations: A social network study*. [Thesis fully internal (DIV), University of Groningen]. s.n.

Copyright

Other than for strictly personal use, it is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license (like Creative Commons).

The publication may also be distributed here under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license. More information can be found on the University of Groningen website: <https://www.rug.nl/library/open-access/self-archiving-pure/taverne-amendment>.

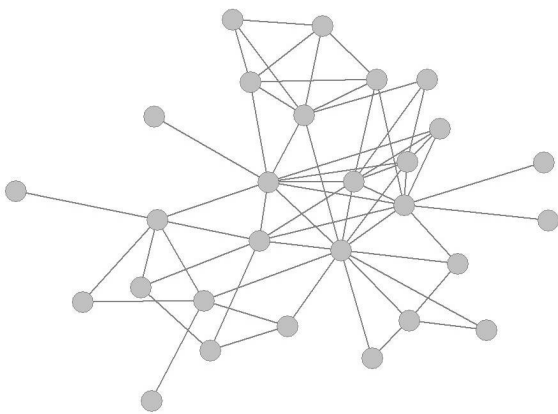
Take-down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Downloaded from the University of Groningen/UMCG research database (Pure): <http://www.rug.nl/research/portal>. For technical reasons the number of authors shown on this cover page is limited to 10 maximum.

Chapter 6

The Co-evolution of Gossip and Friendship at Work: Studying the Dynamics of Multiplex Social Networks



This study investigates the co-evolution of friendship and gossip in organizations. Two contradicting theories are tested. Social capital theory predicts that friendship causes gossip between employees, defined as informal evaluative talking about absent colleagues. Evolutionary theory reverses this causality claiming that gossiping facilitates friendship. The data comprises of three observations of a complete organizational network, allowing longitudinal social network analyses and causal inferences. Gossip and friendship are modeled as both explanatory and outcome networks with Multiple SIENA. Results support evolutionary theory, as gossip increases friendship formation in dyads. However, high gossip activity decreases the number of friends in the group.

Based upon Ellwardt, L., Steglich, C., Wittek, R. The co-evolution of gossip and friendship at work: Studying the dynamics of multiplex social networks. Revised and resubmitted for publication.

6 THE CO-EVOLUTION OF GOSSIP AND FRIENDSHIP AT WORK: STUDYING THE DYNAMICS OF MULTIPLEX SOCIAL NETWORKS

6.1 Introduction

The degree of social integration and cohesion is an important quality of social groups; mainly because of its multiple positive correlates, ranging from well-being (Baumeister and Leary, 1995) to cooperation and performance (Mehra et al., 2001; Oh et al., 2004; Sparrowe et al., 2001; Sparrowe and Liden, 1997). Cohesion increases with the number and quality of interpersonal ties – in organizations referred to as informal relations – between group members. Because of the positive correlates it is not surprising that practitioners seek ways to increase social integration and that organizational scholars have devoted considerable attention to researching antecedences of informal relations in work groups.

Much of the previous research on the evolution of informal organizational networks has focused on either attributes (e.g., trait homophily, Balkundi and Kilduff, 2005; McPherson et al., 1992; McPherson et al., 2001), or structural antecedences based on the relationship itself (e.g., centrality or reciprocity in uniplex networks, Grosser et al., 2010; Sparrowe and Liden, 1997). Whereas this research produced many valuable insights for our understanding of the emergence of informal relations, one of the key theoretical elements on the dynamics of social relations has not been fully explored. This key argument is that the dynamic of one type of social relation is usually tied to the dynamic of another type of social relation (Kossinets and Watts, 2006; Labianca and Brass, 2006). This phenomenon is called co-evolution of social relations. Social networks in organizations are likely to consist of more than one relationship type and can be more precisely viewed as *multiplex* networks. For example, theories on interpersonal trust relations assume that the development of trust is preceded by personal contact and exchange of communication (Burt and Knez, 1996). Interpersonal trust, in turn, breeds further communication and contact.

So far, the co-evolution of multiplex relations has not been systematically addressed in the literature on intra-organizational network dynamics and cohesion in informal groups. The purpose of the present study is to examine the co-evolution of two social relations that have been identified as representing important dimensions of group cohesion: friendship ties and gossip relations. Friendship, on the one hand, implies trust, affection, and bonding between people, which eases cooperation and the exchange of discrete information. Gossip, on the other hand, implies the sharing of potentially important information about third parties as it helps the receiver to learn more about the trustworthiness of others. Workplace gossip is defined as “informal and evaluative talk in an organization about another member of that organization who is not present” (Kurland and Pelled, 2000, p. 429), and can be positive or negative. By providing discrete

gossip information the sender also signals to the receiver that their underlying social relationship is a close one and that the sender trusts in the discretion of the receiver. Hence, gossip can be an ingredient for the facilitation of friendships and cohesion. These arguments demonstrate how one relationship can serve as an instrument to build another one: Friendship may facilitate gossip between people, and gossip may foster friendships.

The result is a “chicken-egg problem”. It remains unclear whether friendship is a precondition for exchanging gossip, or whether gossiping about third parties precedes the creation of friendship ties. In the literature, two theories make predictions about the underlying causal mechanism. While both theories draw on trust and information gathering as an explanation, they assume different causalities. Researchers using social capital theory have argued that an affective relationship stimulates the flow of gossip between employees of an organizational network (Borgatti and Foster, 2003; Burt, 2005; Coleman, 1990). Being embedded in the informal structure of a network either broadens or constrains a person’s opportunity to gossip (Coleman, 1990). More specifically, senders need to be tied to listeners who can be trusted not to reveal the source of the gossip. This required trust is predominantly created in strong informal relationships (i.e., friendships). Furthermore, embeddedness in large social groups creates possible tensions between group members, and thereby the need to gather third-party information on other members. A conclusion from social capital theory is that *friendship relations facilitate gossip between people* over time.

However, scholars employing frameworks from evolutionary theory argue that friendship is not a precondition for the occurrence of gossip, but rather that friendship is a product of gossip behavior. (Bosson et al., 2006; Dunbar, 2004; Jaeger et al., 1994; Rosnow, 2001). According to them, individuals establish and maintain informal relationships through the activity of gossip. By providing discrete information on third parties, gossipers signal trust and interest in a durable relationship with each other (Bosson et al., 2006; Burt, 2001). Researchers agree that gossiping with others helps people to monitor disruptions in the social landscape of large networks, find potential allies, and strengthen interpersonal relationships. Evolutionary theory predicts that, over time, *people better integrate into a social network, the more they gossip with others*.

Despite their congruence in the stated positive relationship between friendship and gossiping, the two theories contradict one another in the predicted causality. The present study offers two major contributions. First, we respond to the request of many theories for a multiplex approach on employee networks. We explicitly examine several types of informal relationships as co-evolving phenomena and apply an innovative research design. Because causal inferences can only be made based on repeated measures, we carry out longitudinal analyses on complete social network data from a Dutch childcare institution from several points in time. More specifically, a dynamic actor-based approach is applied, which considers actors to make rational choices with regard to creating, deleting, or maintaining social ties over time. A novelty of the present study design is the incorporation of two dependent network variables in one model: gossip and friendship. Modeling more than one dependent network variable is a major innovation in social

network analysis because it allows for the investigation of causal hypotheses on the co-evolution of multiple network types. Drawing on a new SIENA version, the *Multiple SIENA* program (Snijders et al., 2008), enables us to test multiplex structures of gossip and friendship networks. To our knowledge, this study is one of the first using this approach. Second, testing co-evolution can have important consequences for theories on employee networks. With our approach, we tackle the above theoretical puzzle. Social capital theory, which claims gossip to be a product of friendship, is tested against evolutionary theory, which claims gossip to be an easy pathway to friendship, rather than a product thereof.

6.2 Theoretical Background

Informal relations in formal organizations are often multiplex: employees who approach each other for advice may also lend each other money, or become friends. Often, within such multiplex relations, one type of relation (like gossip) gradually follows from another type of relation (like friendship). Previous research has shown that friendship and gossip are closely interrelated and might stimulate one another in their evolution (Bosson et al., 2006; Burt, 2005; Jaeger et al., 1994; McAndrew et al., 2007; Peters et al., 2009). However, not much is known yet about the sequence with which friendship-gossip multiplexity emerges: does friendship breed gossip, or does gossip bring about friendships? In the following, we present two different theoretical frameworks that explain how friendship and gossip co-develop: social capital theory and evolutionary theory.

6.2.1 *Social Capital Perspective*

A key assumption of the social capital approach to organizations is that being tied to resourceful others can provide access to critical resources and support at the workplace¹² (Brass et al., 2004; Labianca and Brass, 2006; Lin, 2001), as well as constrain one's action opportunities (Burt, 2005). Individuals evaluate existing and potential new contacts with regard to the potential benefits they may yield. This holds true both for the sender (i.e., ego signaling interest in a friendship relation with alter) and the receiver (i.e., ego receiving signals that alter is interested in a friendship relation) of friendship signals. Friendship in ego-alter dyads is often mutual (Knecht, 2007). However, a friendship "nomination" by ego may not immediately lead to reciprocation with a friendship choice by alter, but involve some intermediate steps in which alter first gathers more information about the trustworthiness of ego. Intensifying one's relationship with a new contact has opportunity costs for one's existing network. The time and attention ego

¹² Social capital results from friendship relations and informal socializing, and was found to affect a large variety of individual or organization level outcomes, e.g. leadership effectiveness and power (Balkundi and Kilduff, 2005), performance of individuals and groups (Mehra et al., 2001; Oh et al., 2004; Sparrowe et al., 2001; Sparrowe and Liden, 1997), job satisfaction (Morrison, 2004), access to information, organizational learning, and innovation (Burt, 1992; Podolny and Baron, 1997), social control and interpersonal conflicts (Lazega and Krackhardt, 2000; Nelson, 1989).

invests in the new contact may come at the expense of the time and energy invested in his or her existing contacts. We posit that individuals who receive a friendship signal from a specific alter will first “reciprocate” with gossip for three reasons.

First, ego does not yet know to what degree a specific alter who wants to establish a friendship relation can be trusted. Trust is the willingness to commit to a collaborative effort before knowing how the other person will behave (Burt, 2005). The nature of gossip implies communicating evaluations of third party behavior. Gossip senders approach gossip receivers with whom they suspect that they interpret the reported behavior similarly, and thus share the gossip senders’ belief (Burt, 2005). This requires interpersonal trust: “when you exchange sensitive information with someone, trust is implicit in the risk you now face that the other person might leak the information” (Burt, 2005, p. 93). The trust embedded in friendships reduces potential drawbacks of gossip behavior, such as rejection and damage of reputation. At the same time, exploiting an interpersonal trust relation can cause considerable damage, given that such strong ties usually involve large investments in terms of time, resources, and emotions. A useful strategy to limit the potential damage from defection is to start with minor transactions and then gradually expand the exchange (Blau, 1964). Repeated positive experiences eventually manifest in trust. Sharing gossip with alter helps ego to establish to what degree alter is willing to reveal sensitive information from his own network, and to assess whether alter will treat sensitive information confidentially: if the gossip returns back to ego, ego knows that alter is not trustworthy.

Second, gossiping helps ego to find out how alter “fits” into ego’s existing network. The new friend may also be a potential source of disruption in ego’s existing network, e.g. if some of ego’s friends do not like the new contact because they had a conflict with him or her in the past. In this case, befriending this new contact may cause more harm to ego’s social capital, rather than enrich it. To avoid potential tensions in one’s network, ego needs to find out how alter is positioned towards third parties, and whether the new friendship would potentially damage valuable friendships in ego’s existing network. In this process, gossiping serves as an echo sounding device. It helps to inspect the environment of the dyad and delineate its boundaries. In line with this reasoning, a recent study showed that sharing mutual third party ties led to negative gossip in employee dyads (Grosser et al., 2010).

Third, reciprocating friendship signals with gossip is a credible strategy to build a trust relationship, since ego makes him or herself vulnerable by sharing potentially sensitive information about third parties with alter. Given these assumptions, social capital theory hypothesizes that the multiplexity of gossip and friendship emerges as a result of friendship choices first being reciprocated by gossip, before they eventually become mutual friendship choices:

Hypothesis 1a (social capital): If ego nominates alter as a friend, alter will reciprocate this with gossip behavior over time.

Employees who receive many friendship nominations – and thus are popular in the network – have much choice with regard to which friendships to reciprocate and which not. The larger the number of friends in ego’s personal network, the higher the likelihood that some of the relations between ego’s friends are troubled. This increases the risk that ego’s personal network becomes disrupted, and its social capital value decreases: some contacts may start to disinvest due to the resulting conflicts or imbalances. Hence, the more friendship choices ego receives, the stronger the need for ego to monitor his or her social network for potential disruptions resulting from tensions between his or her contacts. As a result, individuals who are popular as friends are particularly likely to gossip:

Hypothesis 1b (popularity): The higher the number of friendship choices received by ego, the more likely ego’s gossip activity will increase over time.

6.2.2 Evolutionary Perspective

Based on the finding that humans devote a significant amount of their conversation time (up to two thirds) to talking about absent others (Dunbar, 2004), evolutionary psychologists reason that gossip is a vital and effective instrument for individuals to find out about friends and foes in their wider social environment (Barkow, 1992; De Backer and Gurven, 2006; Dunbar, 1996; Dunbar, 2004; Emler, 1994; Hess and Hagen, 2006; McAndrew and Milenkovic, 2002; Wilson et al., 2000). Gossiping allows for an examination into the trustworthiness of one’s existing contacts as well as potential new ones. It helps to detect cheaters and free-riders, and to identify potential allies or sources of social support. By reducing the interaction opportunities of cheaters, gossip has a vital function both in the prevention of potential damage and its mitigation. Close social ties like friendship relations, are often multiplex: in addition to affect and liking, friends often help each other out in many ways, ranging from small loans or gifts, to sharing confidential and sensitive information. Therefore, friendship ties involve a high amount of trust, and usually result in considerable investments of time and energy. The solidarity norms governing these relations prescribe that these transfers need not be repaid immediately, which can result in considerable (temporary) imbalances in the “accounts”. As a result, friendship relations, when exploited by one of the two partners, can cause substantial damage, materially and emotionally. Hence, gossip can be expected to play an essential role in the formation of new friendship relations in at least two ways.

First, gossip was indeed found to be a means for advertising one’s qualities as a friend (Burt, 2005; Dunbar, 2004; Gambetta, 2006; Hess and Hagen, 2006). Before entering a friendship relation with a specific other, disclosing private and secret information about someone else in one’s network is a credible signal of faith in the other person, and a potential first step towards building interpersonal trust (Burt, 2001; Burt and Knez, 1996).

Second, gossiping also signals one’s position in the overall social network of the group. The gossip sender can test receivers’ reactions to the disclosure of information on third parties. Gossip is a social statement where senders signal that they are closer to the

receivers than to the object of gossip (Merry, 1984).¹³ Similarly, the receiver learns whether the sender shares the same friends and mindset. If the receiver has attitudes on third parties similar to the sender, the latter's suitability as a friend will increase in the receiver's perception.

Several experimental and survey studies have demonstrated the role of gossip in the formation of friendships. They show that sharing positive information about friends and negative information about disliked others promotes interpersonal closeness (Bosson et al., 2006; McAndrew et al., 2007; McAndrew and Milenkovic, 2002), which is consistent with predictions from balance theory (Heider, 1958). Due to their cross-sectional research design, these studies could not draw strong conclusions about the *process* of friendship formation.

Compared to immediately entering a friendship relation and making oneself vulnerable to the exploitation of interpersonal trust that comes along with friendship, the risks associated with using gossip as a signaling device before entering a friendship are relatively small. If the receiver reacts negatively to the gossip, this may block the development of a friendship relation with the receiver and eventually result in a bad reputation for the sender as a gossipier, but it will not cause other losses that could result from a breach of trust in a friendship relation. In sum, we expect that individuals are likely to interpret a sender's repeated gossip behavior as a signal of intimacy and a shared mindset, which increases the likelihood that they respond with friendly feelings.

Hypothesis 2a (social bonding): If ego gossips to alter, alter will reciprocate with friendship over time.

Employees who frequently share gossip possess high information status in the group, which makes them particularly attractive as friends. Active gossipers have a broad overview of what is going on in the group and hence are able to warn about potential frauds or suggest beneficial contacts to others. Therefore, establishing a close relationship with an active gossipier can be an efficient instrument to monitor the behavior of others beyond one's own circle of influence. Evolutionary theory argues further that group members interpret the spread of gossip as a signal of commitment to group norms: by making public the type of norm violation and who the norm violator was, gossipers demonstrate that they are aware of group norms and their eventual violation (Dunbar, 2004; Kniffin and Wilson, 2010). This, in turn, enhances the social status of gossip senders. Therefore, we expect that an employee's number of friends increases with the employee's tendency to spread gossip in the group.

Hypothesis 2b (social integration): High gossip activity by ego causes an increase in ego's popularity in the friendship network over time.

¹³ The gossip sender, however, needs to take away the receiver's concern that the sender may also talk about the receiver himself when absent (especially when they are no friends yet).

6.3 Research Design and Setting

6.3.1 Data

Panel data were collected in one site within a medium-sized Dutch non-profit organization at three time points, namely in Spring 2008, Autumn 2008, and Spring 2009. The organization was a major regional child protection institution. These data sets were collected in a site specializing in treating children with special needs, involving problems with their social, psychological, and/or physical functioning. This site employed 45 social workers, behavioral scientists, therapists, medical doctors, and administrative staff. It was an ideal size for this study because there were enough employees for longitudinal network analyses, but it was still small enough to be able to collect data on complete networks using self-administered questionnaires. The site operated rather independently from the organization, with the employees rarely engaging in contact with organizational members outside the site. Within the site, the organization was split into seven teams of two to eight employees, some of which were directly engaged in treating children, while others performed various support functions. None of the teams had formally designated team leaders or supervisors; instead, the teams were all managed centrally by one male manager. Only one of the remaining employees was male, and most were part-time employees.

Due to employee turnover, meaning that some of the 45 employees joined or left the site during the course of our study, the sample size varies between measurement waves. In the first wave 29 out of 34 employees (85.3%) completed the survey. In the second wave 32 out of 37 employees (86.5%), and in the third wave 33 out of 38 employees (86.8%) participated. These response rates provide a solid basis for longitudinal network analyses, as good estimates can be obtained with response rates of 70% or higher (Kossinets, 2006). The mean age of the employees was 36.11 ($SD = 11.39$), and on average they had been working in the organization for seven and a half years at the start of the study ($M = 7.62$, $SD = 5.68$).

6.3.2 Measures

Measures included network data, which captured the relationships between employees. Gossip and friendship relations, which served as co-dependent variables in the analysis, were assessed at three time points with a time lag of six months.

Peer-rated gossip with colleagues. In each of the three measurement waves, we presented respondents with a roster of the names of all employees working at the site. The respondents were asked to indicate from whom they had received gossip during the last three months. Due to the social disdain commonly associated with gossip behavior, we refrained from using the term 'gossip' in the questionnaire to avoid social desirability bias, which had been found to affect self-reported gossip in earlier studies (Nevo et al., 1994). Instead, we asked whether they engaged in informal, evaluative talking about absent colleagues, which is in line with the definition by Kurland and Pelled's (2000). As an additional measure to reduce social desirability and self-serving attribution bias, we

asked respondents to name the person from whom they had received gossip (which is called a “peer-rated relationship”), rather than asking about self-reported gossip behavior (i.e., to whom they were sending gossip). Based on the gossip question we retrieved a directed, binary adjacency matrix for each measurement wave, where 1 indicated a present gossip relation, and 0 indicated an absent gossip relation.

Friendship. In addition to asking about gossip, respondents were asked to describe their social relationships with every other employee on the following Likert scale: (1) “very difficult,” (2) “difficult,” (3) “neutral,” (4) “friendly,” and (5) “good friend.”¹⁴ This directed, valued network captured the quality of the dyadic relationships within the network, as reported by each individual. Providing five answer categories rather than just two (e.g., friendship versus no friendship) made it easier for employees to answer our question on the relationships with every colleague. However, our theoretical approach and the analytical approach described below, required a dichotomized friendship variable. The distribution of the variable was bimodal with primarily answer codes of 3 and 4. We therefore recoded all of the “friendly” and “good friend” relationships as 1, and the remaining types of relationships as 0 to identify friendships in the network (the term “friendly” is stronger in connotation in Dutch than in English and translates more directly to “friendship-like”). Again, based on the friendship question we retrieved a directed, binary adjacency matrix for each measurement wave, where 1 indicated presence of friendship nomination, and 0 indicated absence. Both friendship and gossip were incorporated as dependent network variables in the analysis.

Controls. We needed to rule out differences in gossiping and friendship formation based simply on proximity and the amount of interaction employees had with one another. This was necessary because employees in our organization were assigned to formal teams and within those teams operated on differing work schedules due to their part-time contracts. Therefore, we controlled for formal team structure and weekly contact frequency in every dyad. In addition to that, several common network configurations and a period dummy served as control variables, which will be detailed in the Analytic Strategy section.

Formal team membership. As described above, the site was organized into seven teams with sizes of between two and eight employees. Prior to the study, the organization provided the data on the formal work teams in this site. Based on this information we created a symmetric, binary matrix on formal team membership, and tested whether being in the same group (i.e., high proximity) led to more gossip or friendship between two employees. Formal team membership was included as a constant dyadic covariate in the analysis.

¹⁴ The question on relationship quality is roughly translated as follows: “With some colleagues we have a very good relationship. To some we would even confide personal things. With other colleagues, however, we can go along less well. The following question asks about your relationships with your colleagues. How would you describe your relationship with each of the following people?”

Contact frequency. Because most respondents were contracted part-time, we needed to control for possible contact frequency. However, the number of contracted hours turned out to be a rather unreliable measure, because for some employees the actual hours worked differed largely from the contracted hours. Furthermore, we were interested in the possible contacts in every dyad. Therefore, we asked each respondent to study a roster of the site members and rate how often they had formal or informal communication with each colleague during the previous three months on a Likert scale that ranged from (1) “never” to (6) “eight or more times per week.” This communication network captured repeated patterns of work-related interaction between employees (Brass and Burkhardt, 1993; Scott and Judge, 2009), so that we could control for the employees’ amount of contact with each other. Contact frequency (in wave one and two) was included as a changing dyadic covariate in the analysis.

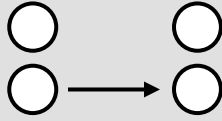
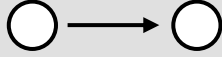
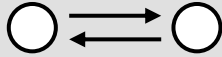
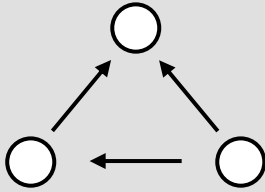
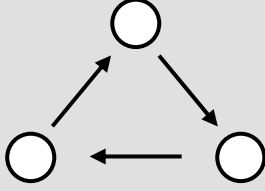
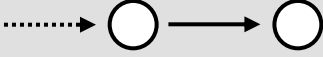

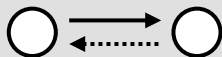
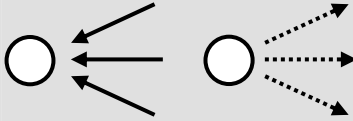
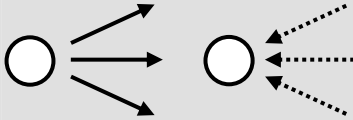
6.3.3 *Methods of Analysis: Multiple SIENA*

Our hypotheses cover two distinct levels of analysis. On the one hand, we made predictions on the co-evolution of gossip and friendship ties in employee *dyads* (hypotheses 1a and 2a). On the other hand, we hypothesized on the *network level* that the employees’ popularity in the group affects their gossip activity, and vice versa (hypotheses 1b and 2b). The complexity of our research questions requires an approach specifically designed for longitudinal social networks analysis. We use an actor-based approach that models the co-evolution of several social networks and behavioral dynamics.

An actor-based model. To date, researchers have used the program SIENA, shorthand for Simulation Investigation for Empirical Network Analysis, to carry out the statistical estimation of models for repeated measures of social networks. SIENA has been most widely applied in the analysis of friendship networks in schools (Baerveldt et al., 2008; Burk et al., 2007; Dijkstra et al., 2010; Knecht, 2007; Sijtsema et al., 2010), and its growing popularity drives continuous development by social network researchers. The basics of the model are detailed in Snijders, Van de Bunt and Steglich (2010). In this paper we use a variant of the SIENA model that allows the study of multiplex networks.

Multiplex networks. In our analysis, both gossip network and friendship network serve as explanatory and as outcome variables. We will refer to the testing of several dependent (outcome) networks as a multiplex test. While we need a model where we can specify *two dependent networks* to estimate parameters for their co-evolution, the SIENA model commonly used only allows the specification of one dependent network. This shortcoming was overcome only recently, when the SIENA program was extended to *Multiple SIENA* (beta version 3.3, Snijders et al., 2008). Multiple SIENA allows analyzing multiplexity, more specifically whether a change in one dependent network causes a change in another dependent network. To our knowledge, this study is one of the first to investigate multiplex networks longitudinally.

Table 6.1 Effects in Multiple SIENA

Effect	Explanation	Graphical Presentation
Rate	Basic parameter indicating the number of opportunities to make changes in a certain network	
Endogenous Network Effects		
Out-degree	Ego's tendency to create ties in a certain network	
Reciprocity	Preference for mutual ties between ego and alter in a certain network	
Transitivity	Ego's preference for creating ties with ego's friends' friends; measure for network closure	
3-cycles	Negative values denote preference for hierarchical ties in the networks. Positive values indicate generalized reciprocity.	
Exogenous Network Effects (Multiplex)		
Dyadic covariate	Ego's tendency to create ties in Network A depending on ego's ties in Network B	
Out-degree multiplex	Ego's tendency to create ties in Network A together with ties in Network B	
Reciprocity multiplex	Creating ties in Network A by ego (out-degree) is reciprocated with nominations in Network B by alter (in-degree)	
Popularity × activity multiplex	Ego's general number of received nominations in Network A (in-degree) affects ego's general number of created ties in Network B (out-degree)	
Activity × popularity multiplex	Ego's general number of created ties in Network A (out-degree) affects ego's general number of received nominations in Network B (in-degree)	

Note. Parts of this table were taken from Sijtsema et al. (2010).

Analytic strategy. A visual presentation of all effects in our model can be found in Table 6.1. We proceeded in two hierarchical steps to specify the model. We first modeled control variables only, which can be classified into endogenous network configurations and dyadic covariates. Endogenous configurations are predominant structures in the network that influence changes and therefore require controlling. We controlled for

configurations often observed to influence the dynamics of friendship networks (Knecht, 2007): out-degree (representing the tendency to create new ties), reciprocity, transitive triplets (representing the tendency to close triads), and 3-cycles (representing the tendency for generalized reciprocity). Changes in the network are expressed with rate parameters. We used the same control variables for modeling the friendship and the gossip network. The dyadic covariates, i.e. contact frequency and team membership, controlled for exogenous effects on the dependent networks. Furthermore, we included a dummy variable to avoid biases in the results due to large differences in change between the two time periods. The dummy was incorporated as a changing actor covariate in the model, with the code 0 for the first time period (between wave one and two), and 1 for the second time period (between wave two and three). Again, this was estimated for both gossip and friendship network.

In the second step, we added multiplex parameters to the estimation to test our hypotheses. On the dyadic level, this included out-degree and reciprocity effects between gossip and friendship ties. On the network level, this comprised effects regarding the relationship between gossip activity and friendship popularity.

The model parameters are estimated according to the requirements outlined in the model specification section, using an iterative stochastic approximation algorithm. Estimation was done using the Method of Moments (MoM, Snijders et al., 2007). The first observation is used as a starting point for estimating the network evolution process. Model estimation amounts to the identification of those behavior rules that fit best the observed trajectory of networks. To gain excellent model quality, as recommended by Snijders et al. (2008), all analyses were carried out with 8,000 iterations and only used for interpretation when the convergence statistics were between -0.1 and 0.1 for all specified parameters.

6.4 Results

6.4.1 Descriptive Statistics

Table 6.2 presents the descriptive statistics of all analyzed variables. The biggest change in-between waves was observed in the gossip network, where on average, employees nominated five colleagues in the first wave ($M = 4.72$, $SD = 3.55$), three to four colleagues in the second wave ($M = 3.56$, $SD = 3.26$), and seven colleagues in the third wave ($M = 6.76$, $SD = 4.92$). The change between the latter two waves was significant in a Wilcoxon's signed-rank test ($z(26) = -3.00$, $p < 0.01$). Employees' friendship choices varied less in-between waves, with ten to twelve friends on average. At all time points, the friendship network was much denser than the gossip network. The networks are illustrated in Figure 6.1. The network pictures were created with the visualization program Visone 2.5.1. Note that only actors are represented who had worked in the organization site at all three time points of data collection.

Table 6.2 Ties, Density, Means (M) and Standard Deviations (SD) of the Networks

Variable	Ties	Density	M	SD
Wave 1 (N = 29)				
Gossip ^a	137	0.14	4.72	3.55
Friendship ^a	300	0.31	10.34	9.62
Contact Frequency ^{a,b}	n/a	n/a	3.16	0.64
Team Membership	146	0.26	4.29	1.85
Wave 2 (N = 32)				
Gossip ^a	115	0.10	3.56	3.26
Friendship ^a	348	0.30	11.57	8.83
Contact Frequency ^{a,b}	n/a	n/a	2.93	0.60
Team Membership	-	-	-	-
Wave 3 (N = 33)				
Gossip ^a	217	0.18	6.76	4.92
Friendship ^a	348	0.29	10.91	9.51
Contact Frequency ^{a,b}	-	-	-	-
Team Membership	-	-	-	-

Note. ^a Statistics calculated based on out-degree. Density was calculated by dividing the number of ties by the number of possible ties. Possible ties are the product of the number of invited people minus missing and the number of invited people minus one. ^b Because contact frequency was measured with an ordinal scale, number of ties and density is not provided for this network. Means of the ordinal scale were first calculated per actor and then used to calculate mean and standard deviation for the whole network.

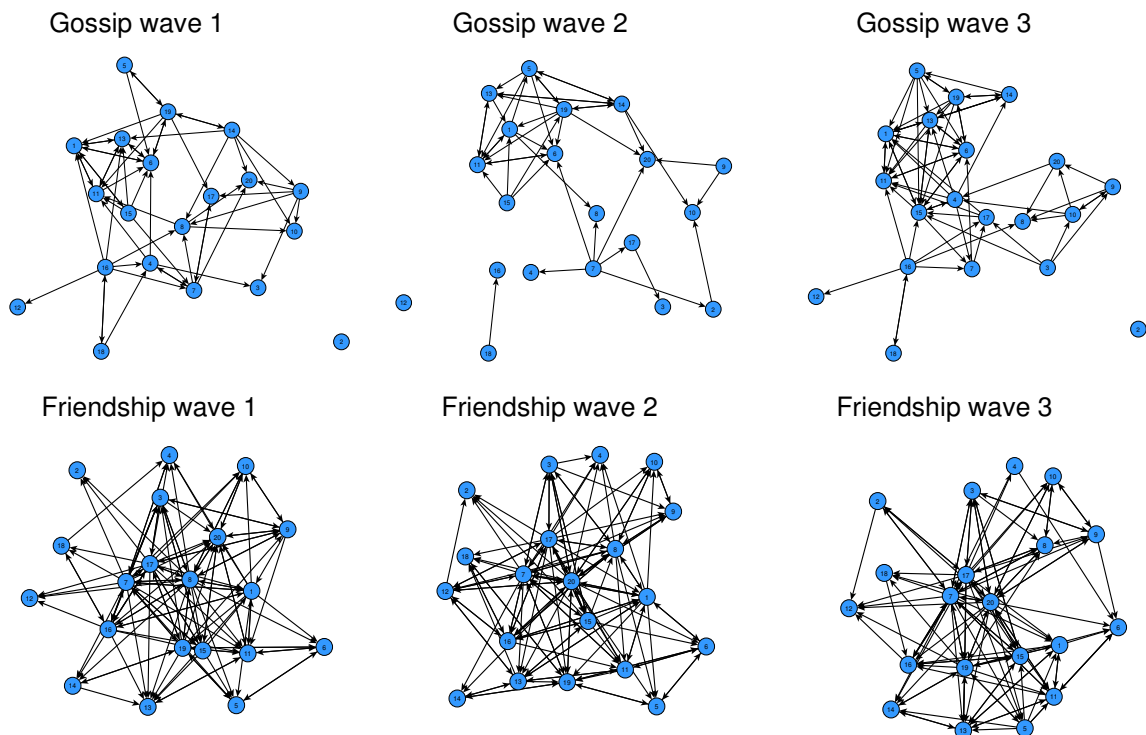
**Figure 6.1** Gossip and Friendship Networks at Three Measurement Waves

Table 6.3 provides details on the relationship between the two dependent networks, gossip and friendship. The cross tabulation gives an overview of counts and percentages of employee dyads in which ego and alter were connected with a gossip tie only, a friendship tie only, both gossip and friendship ties, or not connected.

Table 6.3 Dyad Counts and Row Percentages across Periods

End of Period: Ego's Nominations of Alter					
	No tie	Gossip tie only	Friendship tie only	Gossip and friendship tie	Total
					%
Beginning of Period: Ego's Nominations of Alter					
No tie	694	37	103	19	853
	81.36	4.34	12.08	2.23	100.00
Gossip tie only	23	9	5	15	52
	44.23	17.31	9.62	28.85	100.00
Friendship tie only	97	19	175	48	339
	28.61	5.60	51.62	14.16	100.00
Gossip and friendship tie	17	6	28	62	113
	15.04	5.31	24.78	54.87	100.00
End of Period: Alter's Nominations of Ego					
	No tie	Gossip tie only	Friendship tie only	Gossip and friendship tie	Total
					%
Beginning of Period: Ego's Nominations of Alter					
No tie	588	44	151	35	818
	71.88	5.38	18.46	4.28	100.00
Gossip tie only	25	2	11	10	48
	52.08	4.17	22.92	20.83	100.00
Friendship tie only	136	8	117	58	319
	42.63	2.51	36.68	18.18	100.00
Gossip and friendship tie	13	8	37	47	105
	12.38	7.62	35.24	44.76	100.00

Reading example: A gossip tie by ego at the beginning of a period was associated with a friendship tie by alter at the end of a period in 11 out of 48 dyad cases (22.92%). Missing responses are not included in the dyad counts.

In the upper half of the table, we plotted ego's nominations at the beginning of a time period (e.g., as measured in wave one) against the end of this time period (e.g., as measured in wave two). The dyad counts were summed up for both time periods and contain information on ego's stability in nominating alters. Because we were interested in multiplex reciprocity, i.e. the responses that ego would cause in alter, we plotted ego's nominations against alter's nominations in the lower half of the table. This enabled causal interpretation of change in dyads during the two time periods.

Chi-square tests revealed that in both periods the pattern of the observed dyad counts differed significantly from expectations under random conditions ($\chi^2(9, N = 595) = 110.20, p < 0.001$ and $\chi^2(9, N = 695) = 174.30, p < 0.001$). When we ignore cases without response, we observe that egos' gossip ties tend to be reciprocated with friendship nominations, or a combination of friendship and gossip nominations by alters (in sum 43.75%). In contrast, egos' friendship ties were much less reciprocated with gossip or a combination of both friendship and gossip (in sum 20.69%). There is some indication that gossip produces friendship, whereas friendship produces comparatively little gossip. These insights already deliver slight support for Hypothesis 2a, stating a positive effect of gossip ties on friendship formation, over Hypothesis 1a, which proposed friendship effects on gossiping. However, an inspection of dyad counts yields only vague results and is not a strict hypotheses test. For instance, we need to control for reciprocity in both gossip and friendship dyads when examining multiplex reciprocity. Therefore, we turn to the multivariate analysis.

6.4.2 Results from Multiple SIENA

Table 6.4 reports the results from the Multiple SIENA models. The social capital hypothesis (Hypothesis 1a) stated that ego's friendship nominations are reciprocated with gossip behavior by alter in dyads. The results in model two do not underpin this assumption ($\theta = 0.33, ns$). Employees were not more inclined to start gossiping with colleagues who treated them as a friend. The popularity hypothesis (Hypothesis 1b) predicted an increase in general gossip activity for employees who are popular in the friendship network. This assumption also lacks support in our data ($\theta = -0.23, ns$).

The social bonding hypothesis (Hypothesis 2a) reversed the causality direction of the social capital hypothesis, and suggested that gossiping facilitates friendship formation between employees. In support of this, the significant estimate in model two shows that gossip nominations tend to be reciprocated with friendship nominations in employee dyads ($\theta = 1.67, p < 0.001$). Gossiping employees become friends to their gossip partners. The social integration hypothesis (Hypothesis 2b) argued for positive consequences of gossiping on the group level. According to this hypothesis, an employee's activity in the gossip network would increase the employee's popularity in the friendship network. The results revealed the opposite effect. The negative and significant parameter showed that an increase in gossip degree caused employees loss of friendship nominations from their colleagues ($\theta = -0.21, p < 0.05$). Hence, the social integration hypothesis was rejected. We only found verification for Hypothesis 2a.

Table 6.4 Results from Multiple SIENA on the Co-evolution of Gossip and Friendship

Parameter	Model 1			Model 2		
	Est.	SE	t-value ^a	Est.	SE	t-value ^a
Dependent: Gossip Network						
Out-degree (density)	-2.27	0.22	-10.45***	-2.14	0.57	-3.74***
Reciprocity	0.91	0.27	3.37***	0.36	0.31	1.17
Transitive triplets	0.54	0.07	7.90***	0.51	0.07	7.70***
3-cycles	-0.46	0.13	-3.47***	-0.41	0.12	-3.29***
Period	0.61	0.16	3.94***	0.63	0.15	4.14***
Same team membership	0.86	0.17	4.92***	0.61	0.18	3.48***
Contact frequency	0.09	0.04	2.20*	0.07	0.05	1.63
Friendship (ego)				1.18	0.31	3.85***
Reciprocity friendship (alter)				0.33	0.25	1.31
Friendship popularity on gossip activity				-0.23	0.18	-1.29
Dependent: Friendship Network						
Out-degree (density)	-1.53	0.14	-10.57***	-1.49	0.20	-7.46***
Reciprocity	1.22	0.20	5.98***	0.73	0.25	2.88**
Transitive triplets	0.16	0.01	11.11***	0.17	0.02	10.69***
3-cycles	-0.19	0.03	-5.60***	-0.17	0.04	-4.77***
Period	-0.33	0.10	-3.35***	-0.39	0.12	-3.27**
Same team membership	0.75	0.14	5.31***	0.60	0.16	3.78***
Contact frequency	0.03	0.03	0.96	0.02	0.04	0.69
Gossip (ego)				0.89	0.36	2.45**
Reciprocity gossip (alter)				1.67	0.49	3.43***
Gossip activity on friendship popularity				-0.21	0.10	-2.11*
Network Dynamics (Changes)						
Gossip rate period 1	9.86	1.55		11.06	2.06	
Gossip rate period 2	10.50	1.53		11.73	1.76	
Friendship rate period 1	14.98	2.17		16.21	2.72	
Friendship rate period 2	13.86	1.76		14.86	2.24	

Note. ^a The *t*-values are calculated by dividing the parameter estimate by its standard error. They are not calculated for rate functions because a *t*-test would imply the null hypothesis that no change occurred. Change, however, was evidently measured in our data. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

The Multiple SIENA models contained some more parameters, which we will discuss briefly. The amount of change is modeled by so-called rate parameters for the two time periods (see bottom of table). We also controlled for endogenous configurations in each of the two dependent networks, gossip and friendship. These configurations appeared to be comparable: in both networks there was a tendency

towards transitivity and generalized reciprocity (indicated by negative 3-cycle parameters) in triangles. However, dyadic reciprocity was stronger in the friendship network than in the gossip network. Furthermore, we controlled for ego's tendency to nominate alters as both gossip partners and friends. The positive and significant parameters strongly suggest co-occurrence of gossip and friendship for out-degrees of ego ($\theta = 1.18$, $p < 0.001$ and $\theta = 0.89$, $p < 0.01$). This association was further underpinned by an additional test of endowment functions. It tests whether gossip ties cause dissolving (not creation) of friendship ties, and vice versa. Endowment functions turned out to be insignificant, both in the model and in a score test (gossip effect on friendship: $\epsilon = 0.74$, *ns.*; friendship effect on gossip: $\epsilon = 1.95$, *ns.*). This indicates that the creation of gossip and friendship ties is closely interrelated on the actor level.

Finally, our dyadic covariates affected the dependent networks: being member of the same formal team triggered the formation of both gossip and friendship ties in employee dyads. Having frequent contact increased the likelihood of gossip slightly between employees (first model) but did not affect friendship.

6.5 Discussion and Conclusion

Organizational network literature has long since emphasized that informal relations usually co-occur in multiple forms, and influence one another in their dynamics (Brass et al., 2004). Nevertheless, empirical research has paid little attention to the co-evolution of multiplex networks. The present study examined the co-evolution of one affective and one communicative informal relation in an organizational setting: interpersonal friendships and gossip about absent colleagues. Though previous research showed that the two are related, it remains unclear whether friendships facilitate gossiping between employees, as implied by social capital theory (e.g., Burt, 2001); or whether friendships are a product of gossip interactions, as proposed by evolutionary psychologists (e.g., Dunbar, 1996). Applying a recently developed Multiple SIENA algorithm (Snijders et al., 2008) to longitudinal social network data, collected in a child care organization during a period of one year, showed that gossip favors the creation of friendship relations, rather than vice versa (Bosson et al., 2006): gossip is often shared between employees who are not friends (yet). This finding is in line with evolutionary arguments, and puts into perspective the widely shared assumption that friendship is a necessary precondition for gossiping. However, contrary to our expectation (Hypothesis 2b), disproportionately active gossipmongers became less, rather than more attractive as friends through time.

High gossip activity may decrease a gossipmonger's attractiveness as a friend for two reasons. First, to the degree that someone becomes known as a gossipmonger, gossip receivers are less inclined to interpret the gossip behavior as a statement of trust and intimacy, but more likely to perceive the gossipper as someone who will not treat sensitive personal information confidentially, and therefore are not trustworthy (Emler, 1994). Second, being constantly approached with gossip may raise the concern that the

gossip sender also talks about them or their friends to others (Gilmore, 1978). Active gossipers may not be trusted to keep discrete information to themselves but be perceived as easily accessible sources of third-party information. They may be attractive conversation partners because they provide much knowledge about the social landscape, but receivers will be reluctant to intensify the personal relationship or even become friends.

Several studies showed that active gossipers face the risk of losing the trust of others and being singled out by the group. In a study on an organizational network, Wilson (2000) found that gossiping was perceived as acceptable when it served the group, e.g. it occurred in response to a norm violation, whereas self-serving gossip was judged harshly. Also Jaeger et al. (1994) reported isolation in a friendship network in response to frequent gossiping in their sociometric research on a sorority organization. Moderate gossipers had more close friends than high and low gossipers (Jaeger et al., 1994). However, because the reported study relied on a cross-sectional design, the sequential order of popularity and gossip remained unaddressed. Against the widely assumed linear increase in friendship formation due to gossiping, our findings hint at a curvilinear association similar to the one in Jaeger et al.'s study (1994). From these insights, we conclude that disproportional gossip activities are likely to be sanctioned.

Our study also contributes to theories of network evolution in general, and friendship relations in particular. On the one hand, most theories of network evolution focus on a single relationship, but implicitly assume the presence of co-evolutionary mechanisms that drive its development and change. For example, communication ties tend to precede the evolution of interpersonal trust (Burt, 2005) or advice relationships (Lazega and Krackhardt, 2000). While two relationship types in a network may change independently from one another over time, a change in one type is likely to cause a change in another.

On the other hand, our findings suggest that the literature on friendship relations has underestimated the role of gossip as an antecedent. Most current models of friendship formation focus on dyad-level and person-specific characteristics, like homophily (e.g., Knecht, 2007), or draw on balance theory (Heider, 1958) to incorporate the broader social environment of the dyad. Gossiping may play a crucial but so far neglected role in these processes. When deciding whether or not to intensify the relationship with alter, gossip can help individuals to anticipate the structure of alter's network.

More generally, our findings suggest that gossip represents a "sounding device" which helps individuals to explore and monitor their social landscape. Before creating new friendships, gossip assists individuals in learning about the trustworthiness of potential friends before they have met them. They can find out whether potential new friends will fit into their existing social network, or whether they may create disruptions due to eventual pre-existing conflicts. With regard to their current friends, gossip not only facilitates the detection of cheaters, but also helps individuals to detect potential

interpersonal conflicts or emerging ruptures in their ego-network (processes that are potentially detrimental for their social capital). The notion of gossip as a sounding device in fact is congruent with both the evolutionary and the social capital perspectives, which differ in the hypothesized sequence with which the two types of relationships co-evolve.

We conclude by referring to two limitations of our study. First, data were collected in an organizational setting existing prior to the study, where informal networks had already been established. Opportunities for future research include experimental studies that pinpoint the co-evolution of friendship and gossip relations by examining empty networks (without any pre-existing relations) as a starting point. Second, future research may benefit from a more systematic investigation of co-evolution in a broader set of organizational contexts: our study was conducted in a non-profit organization in the child care sector, with mainly female pedagogic professionals – and a particularly sociable work environment as our exploratory ethnographic studies had shown.

A key finding of our study is that talking about absent colleagues can strengthen informal relationships between employees. Whereas much effort has been put into studying organizational outcomes of interpersonal friendship relations, comparatively little is known about consequences of workplace gossip (for an exception see Wittek et al., 2000). Future research might benefit from a stronger focus on the effects of gossip, and an assessment of the joint as well as relative impact of gossip, friendship and other types of relations. Informal relations at work may have both detrimental and beneficial individual and organization level outcomes such as social support, cooperation, knowledge sharing, advice giving, well-being, satisfaction, politicking, and performance (Oh et al., 2004; Sparrowe et al., 2001). To fully grasp the antecedents, dynamics, and consequences of “the informal organization”, we need a fuller understanding of the co-evolution of multiplex networks. Our findings show that gossip deserves to be part of this research agenda.

