Gossip as Social Exchange in Networks

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To my parents, Ana Schuffenegger and Jorge Muñoz

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Preface

This dissertation focuses on gossip. This is a topic that has not been free of controversy. Much of it has been widely discussed in the literature. Talking about others behind their backs has been socially condemned throughout time in different cultures and groups. Despite this, it seems that gossip has been used extensively by people, to the point that Robin Dunbar in the mid-1990s described it as the equivalent of primate grooming. This raises the question of why people engage in gossip, even if it is not the "best practice". There must be "something" that makes us use it, even though it may put us at social risk in the eyes of others. Some scholars, such as Gluckman in the 1960s, have shown us that gossip has positive individual and group-level outcomes, while others in the last decade have also shown that it can be used as a form of relational aggression that can damage reputations. All in all, gossip can have positive and negative outcomes that are reflected in people's reputations.

It is widely acknowledged that reputations can be created and modified through gossip, and not only of those who are the target or object of the conversation. In the following chapters, we show that gossip can then be considered a valuable good for those who share it. In particular, it can provide other social goods or benefits between its senders and receivers. In any case, the possibility of obtaining positive outcomes from gossip does not mean that individuals share gossip compulsively. Here we also show that the likelihood of gossiping about someone depends (among several potential factors) on the relationship between the sender and the target. In sum, we explore some of the structural factors associated with gossiping *with someone* and gossiping *about someone*.

This is relevant because it provides additional insight into several unclear associations of gossip in groups. Here, we focus on organizational settings that have been widely used to study gossip, to the point where it is possible to find the specific label "workplace gossip" in the literature. In this context, both negative and positive antecedents and consequences of gossip have been studied. We have focused on the

positive, showing that although practitioners and managers may be concerned about gossiping behavior, people can use it in ways that can build and strengthen positive instrumental and affective relationships. Moreover, the latter can also prevent someone from being the target of gossip, while the former does not necessarily do so. Overall, we show that there is a bright side to the use of gossip in these contexts, and that individuals do not use it compulsively to talk about everyone.

The structure of the dissertation includes a general research background chapter in which we present our motivations for this dissertation, introduce the reader to theories of gossip and social exchange, and formalize the methodological approach used in the empirical chapters. In terms of theories, for gossip, we describe its most distinctive characteristics, such as that it is an evaluative conversation about absent third parties, that it can be described in terms of a triad, and that it has multiple social functions. For social exchange theory, we illustrate its main principle of reciprocity, describe how this framework has been used to study gossip, and how we can understand dependencies in social relationships that result from this approach. In terms of methodological approach, we present the data and methods of social network analysis used to describe and infer the relationships studied in our empirical settings. Finally, we summarize the main findings of our empirical chapters and discuss the overall results, limitations, and future directions for research within this agenda.

This chapter is followed by three empirical papers. In the first, co-authored with Flaminio Squazzoni and Károly Takács, we investigate the relationship between positive and negative sender-receiver gossip and the selection of cooperation partners. Using data from two organizations, we tested hypotheses about the structural patterns of these gossip networks and also considered multiplexity with the cooperation networks between individuals within both organizations. In the second, co-authored with Federico Bianchi, we examine the association between neutral sender-receiver gossip and affective relationships. Using data from a single organization, we tested hypotheses about the structural patterns of neutral gossip, about actor-relation effects, and also about multiplexity with an affective relationship network created from several positive ties between co-workers. In the third, co-authored with Francesca Giardini, Federico Bianchi, and Flaminio Squazzoni, we used recent advances in the goal-framing theory of gossip to study situations in which individuals may refrain from gossiping negatively about someone. Using data from a single organization, we tested hypotheses about how functional and affective interdependencies between senders and targets of gossip might refrain the former from gossiping negatively about the latter.

We believe that the results of these chapters can contribute to the current research agenda of different groups trying to study the link between gossip, networks, and cooperation. We show that network patterns are useful for characterizing and describing how gossip is exchanged between its senders and receivers within groups, in particular that it is usually not reciprocated, that it is more likely to take place in small, close-knit, dense substructures, and that it is more likely to be exchanged for instrumental and affective ties. We show that interdependencies between their senders and targets within groups can be useful for describing situations in which people may refrain from gossiping about someone. We found that individuals were less likely to gossip about those they considered friends. This result did not hold for instrumental interdependencies, which means that people do not necessarily refrain from gossiping about those with whom they should cooperate. This is relevant because it has been recognized that negative gossip can be used as a social control device against those who do not comply with social norms.

In this multidisciplinary agenda that has gained momentum in the last decade, this dissertation also contributes to gossip theory by discussing why it should be studied from a social exchange perspective. In doing so, we have been able to provide insights into why interdependencies are relevant to its understanding and why a goal-framing approach to gossip can be a successful step toward unifying theory and focusing empirical efforts on further research. Finally, we emphasize the importance of considering networks as essential for conceptualizing, describing, and inferring gossip behavior. Other empirical approaches that can combine the use of networks, such as agent-based models and experiments, will be critical to improving our understanding of such a complex concept.

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Budapest, February 2025.

Chapter 1

General research background

It is hard to find a phenomenon which has been attributed as many functions as gossip has, individual and collective, positive and negative, mean and noble alike.

(Gambetta, 1994: 199)

1.1 Motivation

This work is inspired by something that has caught my attention since I was very young: the amount of time people spend talking about others in their absence. Simply put, the time we spend gossiping. There is no doubt that people like to talk about other people (Wittek and Wielers, 1998). When we mention to others that we have heard that "*X has been talking (badly) about me*", a typical response we receive is that "*we should not care*" what others say about us. In reality, the opposite is true: we should care about what others say about us. This is the first thing I need to tell you in this work. What we do (and sometimes what we do not do) can be the subject of comments and conversations for others. Based on these exchanges of information, people form an image of us, known as our reputation.

We believe that reputations belong to us, that we can manage them, and that we can act in a manner consistent with the demands of the context. This is what Goffman (1959) suggested in "The Presentation of Self in Everyday Life", where people are supposed to manage the impression they give in a variety of different social interactions. To some extent, this is true. However, in reality, those who determine

our reputations are the people who observe us and comment on our behavior and actions with others. Even more, our reputations are more in the hands (or mouths) of those who have not directly witnessed anything of our behavior, but have received some information (and even also shared it with others). The implication is that gossip and reputation are relational phenomena that depend on the direct and indirect connections we have in our social networks (Foster and Rosnow, 2006). If this is true, it is also possible to think that each of us has as many reputations as the social circles we belong to, and that these groups may hold consistent or conflicting views about it (Takács et al., 2021). So from now on, do not be surprised if someone you know very well changes their behavior depending on the context. What that person is doing, even if unconsciously, is trying to manage his or her reputation.

Therefore, reputation comes with social ties. The importance of our social ties has been a subject of study in sociology for decades. For instance, in the work of Mark Granovetter (1973, 1983), the strength of weak ties was mentioned, especially for their ability to facilitate job seeking. What underlies these contacts is the facilitation of the flow of information about us to other actors belonging to different social circles. The strength of our social ties is important in this context because they represent those with whom we tend to have these conversations or information exchanges on a daily basis. In this line, Ronald Burt's research (Burt, 1992, 2000, 2001, 2004, 2005, 2008; Burt and Knez, 1995) has been a key contribution to understanding how network closure is a central mechanism for the transmission of gossip and the development of trust. Similarly, the concept of "structural holes" and the importance of certain positions (e.g., brokerage) that individuals may occupy within a network, giving them structural advantages due to their ability to manage the flow of information.

Interpersonal relationships can play an important role in the development of these conversations. We can easily find some situations in daily life that might serve as examples. First, we have all heard the phrase "tell me who your friends are, and I will tell you who you are". The projection that others generate based on our contacts is also part of our reputation. Let us consider a simple case: suppose our best friend is a gossipmonger. While this person may be socially valued for having a lot of information about the environment, it may also be rejected. In fact, it is quite likely that we could be considered part of the "gossip group" as a result of our friend's actions. Although "everyone" gossips, talking about others behind their backs is socially undesirable because it violates the basic principle of solidarity. For this reason, and especially because of the affective or instrumental relationships we may have with a potential (gossip) target, we may choose to remain silent and not spread information to other people (Giardini and Wittek, 2019c). Finally, another expression

you may have heard or read is "how you speak about others speaks loudest about yourself". In simple terms, this means that gossip can also affect the reputation of the sender. For this reason, it is perhaps not surprising that a prerequisite for gossip is a relationship of trust between the sender and the receiver of the information, so that its secrecy can be ensured (Gambetta, 1994). What we have seen so far is that knowing who is being gossiped about is as much as important as knowing who is gossiping about others.

However, and fortunately, there are some positive outcomes, which means that gossip can be beneficial to interpersonal and group relationships. Research on gossip has its birth in the work of Gluckman (1963) in the decade of the 60's. This contribution can be considered fundamental in establishing the role that gossip can play for the cohesion of a group, providing ways to maintain its unity, its core morals and values, as well as strengthening its identity. From the same decade, social exchange theorists (e.g., Blau, 1964, Emerson, 1976) suggested that gossip serves at least four social functions: entertainment, information, influence, and affectivity. In this sense, the information that people share and exchange with others could help strengthen existing affective and instrumental relationships or pave the way for their formation and consolidation (Rosnow, 1977).

The idea that gossip can be crucial for bonding individuals (i.e., the sender and the receiver) was then notably developed by Dunbar (1996, 2004; Dunbar et al., 1997), who argued that gossip is for humans the same as grooming is for primates. Subsequently to this contribution, the bonding through gossip mechanism have received support by research from social psychology and sociology (e.g., Bosson et al., 2006; Ellwardt et al., 2012b). However, this hypothesis has not been exempt from criticism. For instance, it has been shown that sharing negative gossip can affect the relationship between the sender and the receiver in circumstances where the receiver and the target have a positive relationship (e.g., Farley et al., 2010; Farley, 2011). All in all, this reminds us of the importance to separate (or not mix and confuse) the social functions from the motives for gossiping (Gambetta, 1994). That is, to understand that despite the benefits that gossip can provide to groups, those who gossip are not necessarily driven or motivated by these group-level outcomes.

In recent decades, there has also been interest in studying gossip and the development and maintenance of cooperative relationships (Dores Cruz et al., 2019; Giardini and Wittek, 2019b; Milinski, 2019). These experimental studies have focused on the effects of gossip on an individual's reputation and the subsequent cooperative behavior of the receiver. In other words, how the receiver behaves after learning information about the cooperative behavior of its future interaction partner (i.e., the

target; usually developed in a game-theory inspired context). At least three different well-known mechanisms have been proposed: "indirect reciprocity" (e.g., Nowak and Sigmund, 1998, 2005), "competitive altruism" (e.g., Barclay and Willer, 2007), and "reputational concern" (e.g., Beersma and Van Kleef, 2011; Feinberg et al., 2012). Despite their notable contribution to the field, experimental studies on gossip have been criticized because (gossip) does not take place in a social vacuum, but instead is closely associated with other multiple relationships, such as trust and friendship (Ellwardt, 2019; Estévez et al., 2022a).

Considering the relational nature of gossip provides researchers with several practical advantages for studying it. First, social network analysis methods can be fruitfully applied to understanding it for several reasons. From its origins, gossip has been recognized as a phenomenon that takes place in small groups, and advances in this area have approached its study in settings such as school classrooms and workplaces, which are well-defined scenarios that easily overcome the "boundary specification problem" (Wasserman and Faust, 1994). Second, with the data granularity that can be achieved, researchers would be able to distinguish the different roles that actors play in these communications, such as senders, receivers, and targets, thus allowing them to capture the triadic dynamics (i.e., *the gossip triad*) and subsequently decompose them into dyads depending on their statistical modeling requirements. Third, it is central to network analysis to consider the multiple relationships that individuals have in a given context, for instance, when two people not only gossip but are also friends or have to work together on a project, i.e. to identify the multiplexity involved in the development of this behavior (Ellwardt, 2019). However, network studies in this area are still scarce, mainly due to some difficulties in data collection.

The aim of this dissertation is to advance in the understanding of the social functions of gossip, through the study of its association with some functional and affective ties developed in the workplace. For this purpose, we have focused in two specific aspects.

1. The relationship between its senders and receivers. We addressed how positive and negative gossip are associated with cooperation, which remains unclear from the perspective of senders and receivers. We also attempted to contribute to the understanding of neutral gossip, a type of gossip that remains underdeveloped both theoretically and empirically. To this purpose, we investigated whether neutral gossip serves as a bonding mechanism for its senders and receivers.

2. The relationship between their senders and targets. We addressed the role that functional and affective relationships between senders and targets may individuals (i.e. senders) decide to refrain from gossiping negatively about them (i.e. targets).

To achieve our goal, we used theories from sociology and social psychology as a means to integrate a broad literature supporting our hypotheses, and exponential random graph models for statistical inference of social networks. The ambition of this project was to theoretically integrate the extensive literature from different social science disciplines and apply it with an empirical approach that takes into account key aspects of these activities, such as interdependencies and the structural mechanisms that characterize their development. Finally, with all the caveats due to the quality of our data, our contribution offers clear and promising directions for future research following this integrative approach.

The remainder of the chapter is organized as follows. Section 2 provides a definition of gossip and introduces social exchange theory as a complementary approach to guide the integration of the gossip literature. Section 3 presents the methodological approach of this dissertation. Section 4 briefly describes the empirical chapters and summarizes the main findings. Finally, Section 5 discusses the overall findings and limitations of this dissertation and provides some future directions for further studies on gossip.

1.2 Theoretical background

Most of us have participated in some way to conversations involving evaluative comments about absent people, either speaking or listening. Given their frequency in everyday life, it is inevitable to be involved in these communications. Their frequency suggests that these conversations should have some intrinsic value. In the complexity of interpersonal relationships, information about those around us is essential for various reasons, including learning, strategic information, and solidarity. However, it is impossible to be present in every situation and directly observe the behavior of others. Therefore, we rely on a simple mechanism: obtaining information through intermediaries, regardless of whether it can be confirmed directly or indirectly. This phenomenon is known as gossip. Gossip is an important social behavior that most people experience, contribute to, and intuitively understand. In this section, our primary goal is to review the nature, characteristics, and social functions of gossip by overviewing various streams of literature. Our contribution extends to the reasons

for conceptualizing it as a social exchange phenomenon, which clarifies its functions and emphasizes the importance of social interdependencies as a key point for any analysis of it. This led us to argue that network analysis offers a useful means of testing research hypotheses from this perspective, thus justifying the development of the empirical chapters that follow this dissertation.

1.2.1 Gossip

Gossip has generally been defined as an informal conversation between two individuals who share evaluative information about an absent third party (e.g., Foster, 2004; Michelson et al., 2010). Given that organizations are our primary setting of interest, Kurland and Pelled's (2000: 429) definition is even more precise for our purposes, and is the one we follow in this dissertation, as "informal and evaluative talk in an organization, usually among no more than a few individuals, about another member of that organization who is not present". This evaluative information constitutes a source of knowledge about (absent) others. Its relevance, even being considered a "core process in all human societies" (Emler, 1994; Dunbar et al., 1997), lies in the variety of functions it can fulfill and its ability to affect individuals and social groups. In recent decades, this phenomenon has experienced a considerable increase in interest and popularity in various disciplines, especially in the social sciences (Giardini and Wittek, 2019a; Dores Cruz et al., 2021a; Számadó et al., 2021). However, this popularity has led to the adoption of multiple research approaches, making it difficult to have a common definition, compare results, and synthesize findings. The importance of investigating gossip is not only justified by its omnipresence in human life (Dunbar, 2004; Emler, 2019). Gossip has transcended cultures, organizations, and social groups (Fine and Rosnow, 1978; Mills, 2010; Beersma and Van Kleef, 2012; Besnier, 2019). The question then becomes: why has it been documented and valued to such an extent?

First, gossip is directly related to the development of language. In this sense, language is the primary means for conveying and exchanging information about other people's behavior (Dunbar et al., 1997). This information can be useful, for instance, for coping with new social situations (Suls, 1977) or for individuals to exercise social control in different groups and communities (Enquist and Leimar, 1993). It has even been suggested that failure to participate in gossip can lead to an individual's exclusion from the group or local social fabric (Bergmann, 1993; Eggins and Slade, 1997; Gluckman, 1963). Despite these benefits and its ubiquity in everyday life, the practice of gossiping has been socially condemned over time (Stirling, 1956; Loudon,

1961; Haviland, 1977; Levin and Arluke, 1985; Besnier, 1989). For instance, those who are perceived as gossipmongers within their group tend to be disliked by others (Farley et al., 2010; Farley, 2011) or rated lower in their jobs by their supervisors (Grosser et al., 2010). Clearly, for gossip and sanctions against it to coexist, there must be a value in the generation and consumption of gossip that outweighs the countervailing force of sanctions (Foster, 2004).

Second, the social sanction against gossip is due to its impact on reputation. This is another concept that has been the subject of several definitions without consensus. However, some clarity on this relationship was presented by Burt (2008), who used trust as a reference point. Trust was defined as a person's willingness to commit to a relationship without being certain of how the other person will behave. From this, the concept of reputation can be derived. Following Burt, reputation is the extent to which a person, group, or organization is known to be trustworthy. This conceptualization is useful because it can be directly linked to gossip, which helps us understand why (gossip) it can define and shape someone's reputation. Burt's examples are even more illustrative in this regard (see Burt and Knez, 1995; Burt, 2001; Burt, 2005). In simple terms, when we need the collaboration of others, reputations facilitate this process by creating a cost for misbehavior. If someone behaves badly toward those with whom they collaborate, others will find out and avoid them in the future. Thus, to secure future collaborations, individuals have an incentive to behave correctly in the present. In particular, with reputational costs for inappropriate opinions and behaviors, trust is less risky, leading to automatic alignment on goals and achieving collaborations that would otherwise be difficult.

Another example from sociology where the association between gossip and reputation could be found is in the social embeddedness of markets (Polanyi, 1944). In this sense, gossip and reputation act as important mechanisms through which social embeddedness facilitates economic transactions (Giardini and Wittek, 2019a). One of the main reasons is that this information can help reduce uncertainty about the reliability of potential exchange partners. For instance, it has been mentioned that in close-knit communities, individuals have reputations at stake that are worth more than the possible gains from a momentary betrayal. That is, in denser social networks, the honesty of its members would be facilitated (Putnam, 2000). Thus, reputation mechanisms play a key role in maintaining the trust necessary to facilitate a wide range of economic transactions. Gossip, on the other hand, helps to constantly assess, revise, and update the reliability of these reputations (Takács et al., 2021).

The social sanctioning is also reflected in some of the definitions used to study gossip. Literature on workplace gossip provides a clear example of how the conceptu-

alization used can lead to either negative or positive conclusions. On the one hand, a large body of research has demonstrated the negative consequences of gossip. It has been mentioned that it can affect emotions, and harm job performance, interpersonal relationships, and the group atmosphere (e.g., Georganta et al., 2014; Jeuken et al., 2015; Dores Cruz et al., 2019; Wyckoff et al., 2019; Martinescu et al., 2021). On the other hand, a second line of research has approached gossip more broadly, highlighting some of its positive consequences (Dores Cruz et al., 2021a). In this sense, it has been mentioned that gossip can be useful for conveying information about desirable behaviors, indirectly punishing those individuals who do not comply with group norms (Baumeister et al., 2004; Dunbar, 2004; Feinberg et al., 2012, 2014). Furthermore, its benefits for cooperation have also been demonstrated, especially in experimental studies (Sommerfeld et al., 2007, Sommerfeld et al., 2008; Giardini and Conte, 2012; Wu et al., 2015a; Wu et al., 2015b). Finally, gossip can also be useful for the formation and consolidation of social bonds among those who share it (Bosson et al., 2006; Ellwardt et al., 2012b; Boehm, 2019).

So far, we have shown that defining gossip is a difficult task. This is reflected not only in the variety of disciplines that have attempted to study it, each with its own jargon, contextual considerations, and analytical frameworks. It is also due to the negative connotations associated with it, which have led to both negative and broader conceptualizations with completely opposite results. Another noteworthy aspect is its strong dependence on context (Rosnow, 2001; Foster, 2004; Giardini et al., 2019b): gossip affects individuals, their interpersonal relationships, and their groups both positively and negatively, and can even informally delimit their boundaries. At the individual level, it can be related to emotions and the decisions that motivate people to engage in it; at the interpersonal level, it is related to interdependencies and the possibility of forming or consolidating such relationships over time; at the group level, it is related to contextual aspects such as social norms of behavior that define what is appropriate or not. Here, we follow what Giardini and Wittek (2019b) mentioned about sociology and its role in this integrative task, suggesting that with its emphasis on analyzing the interaction between the individual and society, it is particularly well equipped to integrate micro-behavioral foundations and macro-level dynamics.

Four distinctive characteristics of gossip

Here we briefly describe some of the distinguishing characteristics of gossip. While they do not follow a hierarchical order, they do follow a logical order for ease of understanding. From our point of view, gossip can be distinguished from other types

of communication because (1) it is evaluative information; (2) it concerns people absent from the conversation; (3) it can be represented in a triad; and (4) it serves different social functions.

(1) Evaluative content

Gossip has been characterized as communication that is evaluative (Kurland and Pelled, 2000; Wert and Salovey, 2004). For instance, gossip would not have gained such popularity and social condemnation if it did not often contain negative content. On the other hand, when we talk about others' behavior, even in a casual, idle, or trivial space (Rosnow, 2001), we are evaluating and contrasting concrete actions with the norms of the context. Most perspectives have assumed that the evaluation or tone of the conversation can be categorized into positive and negative extremes (Noon and Delbridge, 1993; Grosser et al., 2010; Ellwardt et al., 2012a). However, recent studies have shown that people share gossip in almost identical proportions, including positive, negative, and neutral evaluations (Robbins and Karan, 2020; Dores Cruz et al., 2021a, 2021b).

In analyses, definitions of the valence or tone of the conversation are generally "receiver-dependent" or "peer-rated". (i.e., reported by them), which means that they do not always or necessarily reflect the true intentions of the senders, and even more, they can be misinterpreted (e.g., Feinberg et al. (2012), Testori et al. (2023) for gossip; Robbins and Krueger (2005), for *judgements*). The example provided by Dores Cruz et al. (2021a: 263) serves both to illustrate valences and the way in which information about another person, who is not present in the conversation, can be interpreted: "*a sender can share information that they consider neutral such as telling a colleague that another colleague is on holiday. Yet, the receiver can interpret this as either positive (i.e., "the target is taking good care of themselves, more people should do that"), or negative (i.e., "the target is neglecting responsibilities")*". In our view, it is crucial to distinguish between conversational tones or valences for a proper analysis, as there is evidence that each type of gossip can have different effects on the reputation of the individuals involved (e.g., Nowak and Sigmund, 2005) and it is not necessarily observed in the same extent depending on the context (e.g., Robbins and Karan, 2020). For instance, it has been shown that when individuals receive neutral information, it can positively influence the receiver's perception of the person being discussed (Baum et al., 2020). Our position is that the content of gossip is evaluative, and that these evaluations can then be classified into discrete categories of positive, negative, and neutral valence.

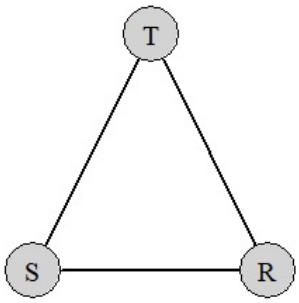
(2) Absent third parties

The most apparent consensus in the gossip literature is that evaluative information focuses on absent third parties (Emler, 1990). This has led to an emphasis on the secrecy of information (Bergmann, 1993) and the need for a trusting or affective relationship between the sender and receiver (Gambetta, 1994). Some have argued that the mere absence of the target of the conversation is sufficient to consider it gossip (e.g., Hannerz, 1967; Besnier, 1989). Moreover, it makes sense for gossip to refer to absent individuals in order to be relevant for reputation formation. By conveying information in the absence of the target, they are completely deprived of any immediate opportunity to defend themselves against what is said. Conversely, in the presence of the target, the messages are expected to be different (Dores Cruz et al., 2021a).

(3) The gossip triad

From an analytical perspective, it is useful and even productive to consider gossip as a triad, an approach that is widely accepted in the literature. This implies that gossip requires at least three actors: a sender, a receiver, and a target (Ellwardt, 2019). Thus, relationships can be represented in a triad that includes the sender-receiver, sender-target, and receiver-target dyads (see Figure 1). Since at least three people are involved, gossip becomes inherently a social activity, directly connecting the sender and receiver and potentially affecting their relationships with the person being talked about (Wittek and Wielers, 1998).

Figure 1. The gossip triad. Letters represent **S**ender, **R**eceiver, and **T**arget, respectively.



Identifying the roles within this triad has several advantages. On the one hand, it allows distinguishing the motives of each actor to participate, as well as the impact on reputation and the influence of context (Giardini and Wittek, 2019b). In

general, there is agreement in the literature that all actors in the triad are affected by gossip (Dores Cruz et al., 2021a). On the other hand, it allows the identification of interdependencies among its members (Giardini and Wittek, 2019c; Nieper et al., 2022). Social network research has shown that dyadic and triadic relationships can explain both the emergence and the co-evolution of gossip (Wittek and Wielers, 1998; Grosser et al., 2010; Ellwardt et al., 2012a; Ellwardt et al., 2012b; Ellwardt et al., 2012c; Estévez and Takács, 2022; Estévez et al., 2022a; Estévez et al., 2022b).

(4) Social functions

Although various social functions of gossip have been highlighted in the literature, here we describe the three most commonly ascribed to its development: (1) obtaining information or validating information received; (2) influencing the behavior of others toward the target or the sender himself; and (3) fostering intimacy or social bonding. It is important to note that the labels assigned to each of these functions may vary from one study to another. However, the identified purpose of their function remains similar.

Information

Gossip is characterized by its informational function, facilitating social comparison and a better understanding of the environment (Hannerz, 1967; Suls, 1977; Foster, 2004; Wert and Salovey, 2004). In this sense, it provides reference points for adapting behavior to different daily situations. This utility becomes more apparent when formal communication channels are saturated (Rosnow, 1977). Furthermore, it has been shown to be vital for individuals to learn group norms, integrate, and feel included (Baumeister et al., 2004; Bauer et al., 2007; Begemann et al., 2021; Martinescu et al., 2021). For instance, in the context of group integration, gossip provides information about informal hierarchies and group dynamics (Fine and Rosnow, 1978; Eckert, 1990) and alerts about threats and opportunities, helping to recognize what is risky and beneficial in the environment (Wittek and Giardini, 2023). This learning achieved through gossip can be decisive in competitive contexts (Hess and Hagen, 2019, 2021).

Influence

The social function of gossip to influence others refers to a situation in which a sender attempts to gain an advantage over a receiver or target by persuading the receiver to

revise his or her opinion of the target (Rosnow, 1977). In this way, gossip is closely related to a normative orientation, i.e., we can learn how to behave and what to do and what not to do by listening to gossip. For instance, from an evolutionary perspective, one of the primary functions of gossip is to informally control free-riders and social cheaters (Enquist and Leimar, 1993; Dunbar, 2004). Other approaches to gossip, such as cultural learning (e.g., Baumeister et al., 2004) and group-level perspectives (e.g., Gluckman, 1963), have recognized this function in a similar way. For gossip to be influential, individuals must agree on norms of behavior and what constitutes acceptability, which gossipers then typically articulate (Foster, 2004). In the organizational context, employees learn what is expected of them by hearing stories that praise high performers and shame low performers; the organizational "culture" is often expressed in gossipy stories (Noon and Delbridge, 1993; Kurland and Pelled, 2000).

Intimacy

The intimacy function satisfies the basic need for individuals to connect emotionally with others and receive support (Baumeister and Leary, 1995), which allows for the expression of emotions and a sense of belonging to a group (Coleman, 1988, 1990). In this sense, exchanging gossip is a way of signaling to both parties that they have similar interests or belong to the same social group, but also that they share a certain level of trust (Rosnow, 2001). Gossip is a selective practice that is shared with those whom the sender believes will understand and support their perspective due to similar past experiences, threats, or opportunities (Martinescu et al., 2019b). Sharing similar experiences creates a sense of bonding. For instance, from a group-level perspective, gossip allows individuals to become socially closer by discussing topics or events relevant to its members (Michelson and Mouly, 2004). This exchange of information establishes boundaries between those who belong to the group and those who are outside of it (Gluckman, 1963; Eckert, 1990; Noon and Delbridge, 1993; Dunbar, 2004). In sum, what begins as a trusted exchange in private can then become the boundaries of knowledge and norms at the group level (Foster, 2004).

On the other hand, at the interpersonal level, it has been shown that gradual exchanges of information about third parties help cement and consolidate friendship relationships between senders and receivers (Ellwardt et al., 2012b). This is consistent with theoretical perspectives suggesting that gossip can strengthen relationships that inherently provide emotional rewards to those involved (e.g., Rosnow and Fine, 1976; Gambetta, 1994; Van de Bunt et al., 2005). For instance, it has been mentioned that

through gossip, individuals can build trust, mutual sympathy, interpersonal closeness, solidarity, and a shared social identity (Fine and Rosnow, 1978; Wert and Salovey, 2004; Bosson et al., 2006; Martinescu et al., 2019a, 2019b).

1.2.2 Social exchange theory

Social exchange theory (SET; for classical references, see Blau, 1964; Cropanzano and Mitchell, 2005; Molm et al., 2007) provides a comprehensive framework for analyzing relationships involving social goods such as gossip (Rosnow, 1977, 2001). SET argues that individuals engage in sequential interdependent transactions that create obligations between them or "the exchange parties" (Mitchell et al., 2012). Exchange parties adhere to certain rules or norms, of which reciprocity is the most basic and fundamental (Cropanzano et al., 2007). This means that the actions of one party elicit a response from the other, typically in the form of reciprocal actions or "repayment in kind" (Cropanzano and Mitchell, 2005; Martinescu et al., 2019a). Through such reciprocal exchanges, individuals build relationships based on trust and commitment (Homans, 1961; Blau, 1964). Although there are several variations of social exchange, most models share common features that may explain the development of relationships. First, an actor's initial treatment toward another individual. Second, the reciprocal responses to the action. Third, the formation of relationships between them (Cropanzano et al., 2007). In addition to norms, it is important that the benefits outweigh the costs for all actors involved to explain their willingness to engage in social exchange (Baldwin, 1978; Molm et al., 1999).

The social exchange perspective on interpersonal relationships has been applied to gossip (Rosnow, 1977; Rosnow, 2001; Martinescu et al., 2019a). The central argument is that there is a correspondence between gossip norms and economic exchange principles (Rosnow, 1977). The value of gossip in the social exchange market derives from the many functions it can serve (Rosnow, 2001). In this context, gossip is defined as "small talk" with social purpose, constituting "a valuable social commodity" (Rosnow, 1977). Gossip represents an instrumental transaction in which the sender and receiver exchange informal dialogues about the target in question in exchange for some valuable (material or symbolic) resource. This could be more gossip, status, entertainment, social control, or any material or psychological stimulus capable of satisfying preconditioned needs, desires, and expectations (Rosnow, 2001).

To support this position, Rosnow (1977) compared three patterns of trading practices identified by Polanyi, Arensberg, and Pearson (1957). The first, *redistributive trading*, denotes the situation in which resources are brought to a central operation

and distributed fairly from there. Gossip works in the same way when it is shared with the intention to inform others, allowing them to make social comparisons and gain a better understanding of their social environment (e.g., Wert and Salovey, 2004). The second, *exchange*, is the case where the value of a commodity results from negotiations to gain some economic advantage. For gossip, this situation is manifested when it is used with the purpose to influence the decisions of others. Examples of this scenario are particularly salient in experiments inspired by game theory, where individuals use reputational information to make cooperative decisions (e.g., Sommerfeld et al., 2007; Sommerfeld et al., 2008) or to select partners for cooperation (e.g., Bravo et al., 2012). The third, *reciprocative trading*, refers to the situation in which goods and services are given and received in an equitable ratio or balanced reciprocity. For gossip, this occurs when it provides entertainment to those who share it (e.g., Gambetta, 1994), even though the shared information may harm a third party.

On the other hand, approaches to dependency in social relationships are also derived from social exchange theory. This association is implied by the argument that social exchange is inherently a joint or shared activity (Lawler and Thye, 2006), which is implicit in most of the social exchange literature (Homans, 1961; Emerson, 1972a, 1972b; Kelley and Thibaut, 1978). For instance, in power dependence theory (Emerson, 1972a, 1972b), the key assumption is that the power of an actor A over an actor B is equal to the dependence of B on A; or in the concept of *activities* described by Homans (1950), as a fundamental dimension in interactions or group settings. These approaches are typically illustrated with functional dependence relationships, i.e., when individuals must rely on the other to provide resources or actions (Balliet et al., 2017), such as to adequately perform their own tasks or to achieve a common goal. However, dependence can also have cognitive-affective sources, such as reliance on socio-emotional support (Lindenberg, 1997). In this sense, shared activities generate or amplify emotional responses that affect the strength of group affiliations or attachments, which are the source and context that generate interdependencies and exchange patterns (Lawler and Thye, 2006).

An influential argument in the literature establishes a direct link between interdependence and gossip. According to the *weapon of the weak* argument (Scott, 1985, 1990), those who are dependent on a powerful actor have an interest in sharing information about that person. Gossip allows them to build and strengthen coalitions, i.e., to form a resistance. However, this argument overlooks the consequences of interdependence with a powerful party. Put simply, it ignores the harm that the target can cause to weaker parties (Wittek and Giardini, 2023). Being aware of the negative externalities and vulnerabilities that gossip can cause can lead individuals

to change their focus and avoid potential losses or simply orient themselves towards preserving their resources (Giardini and Wittek, 2019c). In this sense, dependence on others for the accomplishment of a task or for emotional support and advice can affect the decision to gossip about them. First, because of the expected consequences on the relationship with the target. Second, because of the relationship between the receiver and the target. For instance, if someone knows that I am "a good friend" with the target, they will be less likely to report negative information to me, either because I will downplay it or because I will be annoyed by it. In sum, being aware of the kind of interdependence among actors can shape the choice of refraining from gossip (Lindenberg, 1997; Lindenberg et al., 2006; Lindenberg and Steg, 2007, 2014). For instance, by combining interdependence and goal framing theory, Giardini and Wittek (2019c; Wittek and Giardini, 2023) argued that the decision to gossip can be explained on the basis of the different goals of the gossip sender which are activated by the social and relational context.

1.3 Methodological approach

1.3.1 Data

To test our hypotheses, in the empirical chapters 2, 3, and 4, we used data from a comprehensive network study of different groups of individuals employed in organizations based in Budapest, Hungary. The data comprises a set of relational and individual dimensions of these groups, collected in the field on 2016 and 2018 as part of the EVILTONGUE project[1]. This project was specifically designed to study the relationship between gossip, cooperation, and reputation in organizational settings from a network perspective. In addition, interviews were conducted with HR professionals and managers to obtain qualitative information about the work environment of each of the participating groups.

Network data collection is a complex task, not only because of the time and technical aspects needed for its proper implementation, but also because it imposes a high cognitive load on the participants in the process (González et al., 2024). There are a number of ethical considerations for the collection of data on gossip networks

[1]The Hungarian Academy of Sciences - Centre for Social Sciences 'Lendület' Research Center for Educational and Network Studies (RECENS) carried out the EVILTONGUE project, led by Károly Takács. The data was collected as part of this project by Boróka Pápay and Eliza Bodor-Eranus. The project received funding from the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation programme (grant agreement N. ERC/648693).

(Ellwardt, 2019; Estévez, 2021). Therefore, given these factors, the data used in the empirical chapters of this dissertation have a number of advantages and limitations.

Among the advantages, it can be mentioned that the operationalization of the main concept (i.e., gossip) considered its triadic nature (who gossiped to whom about whom), as well as it was differentiated according to the tone or valence of the information received (positive, negative or neutral). Other advantages of the data are that the missing information within the groups is practically zero (it occurred only for some specific dimensions in one organization); and that there is information on an extensive set of relational dimensions that are theoretically associated with gossip, which could therefore be analyzed empirically as in the following chapters.

On the other hand, the main limitation of the data is its cross-sectional nature. Therefore, it did not allow us to establish causality in order to unravel and clarify the antecedents and consequences of the theoretical associations presented in the empirical chapters. This limitation has been repeatedly mentioned in the literature as a challenge for future studies on gossip networks (e.g., Ellwardt et al., 2012a; Ellwardt et al., 2012b; Ellwardt, 2019). Although the use of longitudinal data for these networks is desirable, it is not always possible to analyze them as such, either because of the temporal distance in data collection, possible changes in the internal composition of groups, or the low stability of gossip networks (Estévez, 2021; Estévez et al., 2022a).

Survey

Relational and individual data were collected through self-administered computer-based questionnaires. The process was supervised on site by researchers from the EVILTONGUE project. The survey was designed in a customized web-based application, which simplified the monitoring and cleaning of the information. The survey lasted approximately 45 minutes. The questionnaires were administered in Hungarian, and the full English translation is provided in Appendix A.1. The questions used to operationalize the main concepts of each empirical chapter are detailed in their respective appendices. The basic questionnaire consisted of 36 items selected from the specialized literature. Organizations had the opportunity to add specific questions of their own interest at the end of the base questionnaire. For confidentiality reasons, this information was not available for academic purposes.

Participants were asked about a range of interpersonal relationships in the workplace, their relationship with their job and with management, and their perceptions of

their wages and career prospects. In addition, individual-level data such as age, gender, educational level, years of experience in the organization, and years of experience in their most recent position were collected.

Methodologically, the decision of how to phrase the question to measure gossip it is not trivial. Gossip has a negative connotation for many people and it is therefore sensitive to social desirability bias (Nevo et al., 1994; Litman and Pezzo, 2005). However, there are at least two alternatives: (1) obtaining self-reported information, such as in the form: "with whom you shared information about another colleague"; or (2) obtaining information from the perspective of the receiver, for instance in the form: "who shared personal information about another colleague with you". This is usually followed by two questions to identify the targets (i.e., about whom was the information received) and the tone or valence of the conversation (i.e., what kind of information it was: positive, negative, or neutral). The latter alternative was implemented (with the additional two questions) in the questionnaire, which is also known as "peer-rated relationship" (Ellwardt et al., 2012b).

This approximation to capture gossip allowed us to: (1) identify all the possible pairs of relationships within the "gossip triad", specifically: sender-receiver, sender-target, and receiver-target; (2) differentiate these networks for the study of positive gossip, negative gossip, and neutral gossip. In Chapter 2, we analyzed the structure of the sender-receiver networks of positive and negative gossip. In Chapter 3, the structure of the sender-receiver network of neutral gossip. Finally, in Chapter 4, the structure of the sender-target network of negative gossip.

These gossip networks were analyzed in association with other relational dimensions captured through the survey. In Chapter 2, we addressed the association with cooperation. We used information on formal or obligatory cooperation, as well as nominations of colleagues with whom one "would not like to cooperate". Thus, by combining the two relational dimensions, we were able to obtain a measure of what can be conceived as cooperation when it is desirable to be realized. In Chapter 4, we also used the information on formal or mandatory cooperation to operationalize collaboration as a proxy for functional interdependence.

Several dimensions of positive affective relationships were also available in the data. In Chapter 3, we focused on the association between neutral gossip and a composite network measure of affective relationships. We used information from five different questions that identified affective-based dimensions of friendship, trustworthiness, frequent personal conversations, appreciation, and listening to others. Finally, in Chapter 4, we used friendship relationships as a proxy for affective interdependence.

1.3.2 Sample

Six different working units[2] participated in the EVILTOUNGUE project, with a total of 128 respondents. All of these groups were based in Budapest, Hungary. From these six groups, two were used as main study cases in at least one chapter, while two others were used as comparative settings for the application of a network dimension reduction method. Here, we briefly introduce all of them and clarify the reasons for which they were or were not used in the analyses. This decision was mainly based on several technical concerns related to the network data needed to apply the statistical models used in the following empirical chapters.

Units selected for case studies

Unit A ($n = 24$) was a subdivision of a large company in the public administration sector. It was established four years before the fieldwork. It consisted of a general manager and five other managers (4 of whom were women), each in charge of groups of 3 to 7 people. The employees were mainly social workers and administrative professionals, most of them young or middle-aged women.

Unit D ($n = 18$) was a company that specialized in developing access control systems for other firms. It was founded in 1990, a few months after the country's democratic transition. Most of the professionals in this unit were trained engineers or IT specialists. Six of them held some management positions (1 of them were women).

These two units represented the cases of study in Chapter 2, in which we addressed the theoretical association between gossip and cooperation. Although most network studies are usually based on single case studies or comparisons of networks within the same set of actors (Faust and Skvoretz, 2002), we decided to analyze both of them because we were trying to clarify an association that is usually mentioned in experimental research but has not yet been directly addressed from a social network analysis perspective. This motivated us to model whether specific network configurations are robust in two different settings that share commonalities in the individual characteristics of their members, as well as some differences in their sector and years of establishment.

[2]The names assigned to these groups follow their original labels in the data. This can facilitate the comprehension of any researcher allowed to use the data in further projects, as well as the understanding of any description provided in other publications previously done with it (e.g., Estévez & Takács, 2022).

However, this attempt also presented a challenge in terms of appropriately defining models that can converge with the same specification parameters and that are well-fitted. Gossip networks are typically sparse rather than highly dense (e.g., Estévez et al., 2022a), which is consistent with some of their theoretical assumptions of trust, intimacy, and secrecy between their senders and receivers. They can be developed in densely connected substructures, which is different from thinking about a highly connected complete network. This aspect also constrained us to select those units where gossip network densities were sufficient to be adequately implemented in the statistical models[3]. Finally, we chose to use Unit A as a single case study in Chapters 3 and 4 because, in addition to its substantive characteristics, we were interested in empirically testing recently developed theoretical arguments that, to our knowledge, have not yet been reviewed in the literature.

Units selected for complementary analyses

Unit B ($n = 19$) was a small web development company consisting of six project managers (3 were women), one administrative professional, and twelve employees. This company was founded six years before the fieldwork.

Unit E ($n = 16$) was a subunit of a software development company. It consisted of six men (all in managerial positions) and ten women (2 of them in managerial positions). This subunit started working about five years before the fieldwork.

These two units were used in a complementary analysis for a network dimension reduction method applied in Chapter 3. With information on different affective-based dimensions, we were able to use these units to verify the robustness of our estimates. However, it was not possible to analyze their respective gossip networks with the statistical models used in the empirical chapters, due to their low densities and the impossibility of achieving convergence with the parameters defined for an appropriate model specification.

Units that were not analysed

Unit C ($n = 29$) was a subunit of another software development company with about 200 employees. It had been established ten years before the fieldwork. All but one member of this unit were men, four of whom held managerial positions.

[3]Gossip networks densities in these units were the highest among all, ranging from 7 to 12 percent in sender-receiver relationships.

Unit F ($n = 22$) was a financial services company. It was founded a few years after the country's democratic transition. Most of the employees in this unit were middle-aged men (only 1 woman worked in this company), four of whom held management positions.

These two units were not used in the analyses presented in this dissertation. The motives for doing so respond to some data quality aspects, such as missing information on key individual-level variables and network variables with respondents who recalled all their colleagues in several dimensions relevant for the purposes of the empirical chapters, particularly for affective-based relationships. In addition, gossip networks have similar issues to those units that were not analyzed in these relationships.

1.3.3 Methods

Empirical studies of gossip structures have been approached primarily through social network analysis (Ellwardt, 2019). These methods allow for a detailed dissemination of the relationships between the actors involved within the "gossip triads", which are characterized by a high degree of interdependence and coordination (Giardini and Wittek, 2019b). Social network analysis methods and statistical models can improve our understanding of gossip for several reasons. First, delimited contexts (e.g., the workplace) are fundamental for defining the boundaries of a network (Wasserman and Faust, 1994). Second, in organizational settings, multiple formal and informal relationships naturally exist, which means that gossip networks can be studied in association with other ties between the same set of actors, such as trust, friendship, and cooperation. Third, statistical models for social network analysis are well suited for obtaining reliable model estimates using relatively small samples. Previous research in this line has shown that the occurrence of workplace gossip is largely determined by certain structural factors as well as by other relationships between individuals (Ellwardt et al., 2012b; Ellwardt et al., 2012c; Estévez and Takács, 2022).

Clustering of multiplex networks

Individuals in a group are connected by various types of relationships, such as friendship, cooperation, liking, or trust. In most cases, researchers use a single network dimension to operationalize more complex concepts. In Chapter 3, we compounded a set of multiple affective-based networks available in the data, following a logic similar to principal component analysis, cluster analysis, or factor analysis (Vörös and Snijders, 2017) to construct a latent relational dimension of affective relationships.

Although this method has the disadvantage that the resulting ties no longer refer to a specific relational dimension, it may help to increase the reliability of a measure that may be closer to the complexity of such relations. However, this is the main reason why we did not follow the same method in Chapter 4, when we operationalized affective interdependence using a friendship network. We privileged the substantive interpretation by using a single dimension that includes affection, even more so when friendship was also illustrated by Giardini and Wittek (2019c) in their example of the solidarity mechanism we were trying to test.

The steps we followed in Chapter 3 considered five different network dimensions from four different units: friendship, trustworthiness, frequent personal conversations, appreciation, and listening to others. For each pair of dimensions, we calculated the matrix overlap, also known as the Jaccard index. We checked the consistency of the values across the 4 units. We then calculated the Kendall's W values to check the level of "agreement", for which all items reach at least a "moderate agreement" value (Kendall's $W > 0.4$). Finally, we compared the densities of the composite or reduced network of affective relationships across units, as well as their densities with the original dimensions. We decided to use a threshold of three out of five dimensions as a condition to define the presence of an affective relationship between two individuals. Detailed information on the networks and the estimates can be found in Appendix C.2.

Quadratic assignment procedure (QAP)

When studying the association between different network matrices, one needs to account for the inherent dependence in the data due to the fact that actors send and receive multiple ties. Therefore, the observed outcomes of the tie variable are not independent. The quadratic assignment procedure (QAP; Krackhardt, 1987), tests the null hypothesis of no correlation between two matrices, Y and X, by repeatedly permuting the order of the rows (and columns) of one of the matrices, Y, while keeping X intact (van Duijn and Huisman, 2011: 464). The process is repeated thousands of times, generating an empirical sample distribution for the correlation coefficient (Knoke and Yang, 2020). The intuition for QAP is that, the observed association between Y and X is significant if it is greater than the association between X and a large proportion (e.g., 0.95) of the networks that can be randomly drawn among the nodes that have the same structure as Y (Cranmer et al., 2020: 27). This method was applied in all the empirical chapters as a way to observe if there is a dyadic level association between the networks, before analyzing them with ERGM.

Exponential random graph models (ERGM)

Social networks are changeable. However, this does not mean that are random and unpredictable. They are built through continuous and multiple social processes that result in the presence of observable network substructures, that is, they have self-organizing principles (Robins and Lusher, 2013b). Stable organizing principles result in patterns of network ties that can be observed in the data, from which we may infer something about the social processes that construct them (Robins, 2011). However, it is not sufficient to inspect the data for one pattern at a time, because structures are built from the bottom up through combinations of local configurations (Lomi and Pallotti, 2013). Exponential random graph models (ERGMs) are a family of statistical models for social networks that allow inference about prominent configurations in the data given the presence of other network structures, i.e., they enable network pattern recognition (Lusher et al., 2013). There are several classes of ERGMs, some with a long tradition in social network analysis (Robins and Lusher, 2013b). Network studies of gossip using ERGMs remain scarce, with a few exceptions (Ellwardt et al., 2012a; Estévez et al., 2022a).

General form of an ERGM and its extension for multilayer networks

Social networks represent relations (e.g., gossip, friendship, trust, collaboration, etc.) between a set of n actors. Such a network can be represented by an $n \times n$ matrix $\mathbf{x} = (x_{ij})$, where x_{ij} represents, in this case, the directed relation from i to j ($i, j = 1, \ldots, n$) (i.e., the observed network). For every pair i and j of actors in the network, let $X_{ij} = 1$ if there is a network tie from i to j, and $X_{ij} = 0$ otherwise. X_{ij} is then a binary random variable, and $\mathbf{X} = X_i j$ the $n \times n$ matrix of all such variables. Self-relations are not considered, so that the diagonal values of both matrices is 0.

For a given set of n actors, an ERGM models an observed network $\mathbf{x}$ by assigning a probability to every network of n actors, based on network configurations that are hypothesized through the dependence hypothesis. The general form of the model is (Lusher et al., 2013):

$$Pr(\mathbf{X} = \mathbf{x}) = \left(\frac{1}{\kappa}\right) \exp\left[\sum_A \eta_A g_A(\mathbf{x})\right]$$

where: the summation is over all configuration types A; η_A is a parameter corresponding to configuration type A; $g_A(\mathbf{x})$ is the network statistic for A and is a count of the number of configurations A observed in $\mathbf{x}$; and κ is a normalizing quantity.

The equation shows that the probability of a network $\mathbf{x}$ depends on the configurations A, i.e., network patterns such as reciprocated ties or triangles. Given a set of configurations, the probability of $\mathbf{x}$ depends on how many configurations are actually observed in $\mathbf{x}$ (the statistics $g_A(\mathbf{x})$), weighted by how important those patterns are (the parameters η_A). Put simply, the estimates inform us whether a certain configuration exists more often in the observed network than expected by chance. The equation implies that there is a probability distribution of all possible networks with n nodes, with each possible network having a distinct probability (Robins, 2011).

To summarize, when we have a single network observation $\mathbf{x}$, the desirable goal of the model is to best represent our observed data, that is, to reproduce the structures we witness in our observed network, and then to interpret the results in terms of the patterns that are important in that network (Robins and Lusher, 2013a). We used ERGMs in the three empirical chapters (2, 3, and 4) to study the structural logic (Markovsky et al., 1988; Rank et al., 2010) of gossip networks and other relational dimensions. In Chapter 2, we used them to test three structural hypotheses for our sender-receiver networks of positive and negative gossip and compared their robustness in two different work units. In Chapter 3, we used ERGMs to study sender-receiver networks of neutral gossip and affective relationships in a single work unit. The use of ERGMs allowed us to test three hypotheses. One was related to structural effects, while the other two were related to actor-relation effects. Finally, in Chapter 4, we used these models to analyze a sender-target network of negative gossip in a single work unit. We tested two hypotheses for functional interdependence and affective interdependence as covariate network effects in our negative gossip network.

ERGMs can be extended to the study of multiplex networks, i.e., multiple relationships among a set of actors. The general form of multilayer ERGMs for social network analysis is as follows (Lazega and Pattison, 1999: 76):

$$Pr(X = x) = \left(\frac{1}{\kappa}\right) \exp\left[\sum_{A} \eta_A \prod_{X_{ijm} \in A} x_{ijm}\right]$$

where X is a random multilayer network with possible ties X_{ijm} (X_{ijm} denotes a possible tie of type m from worker i to worker j), x is a realization of X comprising observed network ties x_{ijm} (with $x_{ijm} = 1$ if there is an observed tie of type m from worker i to worker j, and $x_{ijm} = 0$, otherwise), A is a subset of possible ties (defining a substructure of interest), η_A is a parameter associated with the substructure A (to be estimated), and κ is a normalizing quantity.

In Chapters 2 and 3, we used ERGMs for multiplex networks. In both, we attempted to test two different hypotheses using cross-layer effects (i.e., "entrainment" and "exchange" or "mixed reciprocity" effects) between different sender-receiver valenced (i.e., positive, negative, and neutral) gossip networks and networks of cooperation partners (Chapter 2) and affective relationships (Chapter 3).

1.4 Summary of the chapters

This dissertation comprises three empirical chapters: Chapters 2, 3, and 4 were conceived and written as independent articles for future journal submissions. This implies certain degree of overlap between their main arguments, particularly in some of the theoretical and methodological sections, as well as in certain formatting aspects. In addition, this chapter echoes many of the theoretical sections found in these three empirical chapters, as it attempts to integrate different theoretical perspectives on gossip.

In Chapter 2, we discussed the role of gossip and its informative content in strengthening trust and cooperation in informal relationships among co-workers in two organizational settings. We investigated the relationship between positive and negative sender-receiver gossip with nominations of cooperation partners, using a multilayer network model. With individual-level quantitative information and sociometric data on social relationships among all employees, we estimated single and multilayer ERGMs to test the hypothesis that gossip consolidates cooperation. Our results suggest that gossip and nominations as cooperation partners can be explained by considering endogenous structural factors and cross-network effects. For gossip, we show that it tends to emerge in close-knit structures. Second, we show that it is more likely for individuals to gossip negatively with others if they would also nominate them as cooperation partners. This suggests that negative gossip may reinforces underlying trust in cooperative relationships. Third, we show that individuals are more likely to gossip with other if the latter nominate the former as a cooperation partner, thus indicating that gossip can foster or consolidate other instrumental ties that require interpersonal trust. Therefore, gossiping does not necessarily entail negative reputational consequences for senders, as signaling theory has suggested.

In Chapter 3, we argued that gossip has been ascribed several functions, such as influencing, informing, and bonding individuals. However, while this evidence holds for positive and negative information, the role of neutral gossip is still unclear. From a social exchange perspective, we investigated the relationship between neutral sender-

receiver gossip and affective relationships, using a multiplex network model. For affective relationships, we constructed a composite network from multiple affective-based relations among employees, using a method for clustering multiplex networks. Specifically, we considered friendship, trustworthiness, listening to others, frequent personal conversations, and appreciation. For the analyses, we focused on the dyads representing the senders and receivers of neutral gossip. Using individual-level information and sociometric data on social and affective relationships among co-workers, we estimated single and multilayer ERGMs to test whether neutral sender-receiver gossip fulfills any social bonding function by reinforcing and exchanging information for affective relationships. Our results show that neutral gossip can help individuals strengthen their affective ties, and that information can be reciprocated with affective ties by its receivers. This suggests that neutral gossip may serve a social bonding function through the development of affective relationships without having to incur the reputational risks of negative gossip.

In Chapter 4, we argued that gossip research has often portrayed individuals as tireless sharers of information, with little or no attention to the reputational consequences of information sharing for gossipers. Therefore, potential gossipers may refrain from sharing information about a third party for different reasons. Understanding the absence of gossip is important because it can explain why certain deviant behaviors neither are exposed nor subsequently punished (Giardini and Wittek, 2019). By applying goal framing theory, we tested how functional and affective dependency relationships between potential gossip senders and targets can motivate an individual to refrain from sharing negative gossip. In our analysis, we used a collaboration network to operationalize the functional dependence, and a friendship network to operationalize the affective dependence. We focused on the dyads representing the negative gossip senders and targets for the analysis. We estimated ERGMs for negative sender-target gossip in a public administration organization. Our results show that individuals were less likely to gossip negatively about someone they also considered a friend (i.e., when the sender was affectively dependent on the target). Contrary to our predictions, individuals were more likely to gossip negatively about someone they also had to work with (i.e., when the sender and target were functionally dependent). This suggests that distinctions are necessary whenever studying the structural conditions of gossip behavior, especially for dyadic relationships in which targets are involved.

Table 1 summarizes the research hypotheses and their empirical support for the three empirical chapters.

Table 1. Summary of Hypotheses by Chapter

Chapter	Hypothesis	Support
2. Gossip and cooperation partners in the workplace. A network study at two Hungarian companies	**H1**. Positive and negative gossip between senders receivers are more likely to be reciprocated with positive and negative gossip, respectively, than expected by chance.	No
	H2. Positive and negative gossip between senders receivers are more likely to take place in close-knit structures (i.e., highly cohesive structures), than expected by chance.	Yes
	H3. Individuals are more likely to gossip positively and negatively with others they also nominate as cooperation partners, than expected by chance.	Partial
	H4. Positive and negative gossip between senders receivers is more likely to be exchanged with a nomination as a cooperation partner, than expected by chance.	Yes
3. Neutral gossip and affective relationships in the workplace	**H1**. Neutral gossip ties are more likely to be reciprocated, than expected by chance.	No
	H2. Workers who have joined the organization more recently are more likely to send neutral gossip ties, than expected by chance.	No
	H3. Managers are more likely to send neutral gossip ties, than expected by chance.	Yes
	H4. Neutral gossip is more likely to be initiated with those with whom one has an affective relationship, than expected by chance.	Yes
	H5. Neutral gossip is more likely to be reciprocated with an affective relationship, than expected by chance.	Yes
4. Why do (don't) individuals gossip? A network study in a public administration organization	**H1**. Individuals are less likely to gossip negatively about someone if they are functionally interdependent, than expected by chance.	No
	H2. Individuals are less likely to gossip negatively about someone if they are affectively interdependent, than expected by chance.	Yes

1.5 General discussion, limitations, and future directions

In this dissertation, we attempted to study gossip as a social exchange in networks. To do so, we combined several theories from sociology and social psychology to inspire our research hypotheses. We followed Giardini and Wittek's (2019b) premise that sociology is well equipped to integrate the micro-behavioral foundations and macro-level dynamics of gossip and reputation. In three different empirical chapters, we outlined the four distinctive characteristics of gossip and provided theoretical arguments for how the integration of the literature can benefit from conceptualizing gossip as a *social exchange*. Empirically, we used methods of social network analysis to statistically describe and infer the structural characteristics of gossip and its interplay with other

relationships. Our empirical settings were organizations in which gossip has been the focus of several studies using these methods (e.g., Wittek and Wielers, 1998; Grosser et al., 2010; Ellwardt et al., 2012a; Ellwardt et al., 2012b; Ellwardt et al., 2012c; Estévez et al., 2022b; Estévez and Takács, 2022). Based on our findings, we outline our main conclusions here.

Our first conclusion is that there are distinct structural aspects that can account for gossip relationships, but these depend on both the dyadic relationship of the observed network and the valence of the information. In our three empirical chapters, we focused on two dyadic relationships (i.e., sender-receiver dyads; and sender-target dyads) within the gossip triad. For sender-receiver dyads, we observed networks of positive, negative, and neutral gossip. For sender-target dyads, only negative gossip was observed. We found that certain network configurations were more likely than expected by chance. However, the results were not consistent across positive, neutral, and negative gossip valences, nor across the dyadic relationships of the networks analyzed. In Chapters 2 and 3, we tested hypotheses about reciprocity, following the basic "repayment in kind" principle of social exchange theory. Our results showed a positive tendency toward reciprocity for positive and negative gossip, while the opposite direction was found for neutral gossip between senders and receivers. However, these results were consistently not statistically significant.

On the other hand, even we did not tested any specific hypothesis for reciprocity in negative sender-target gossip, our results showed a positive and statistically significant coefficient for this parameter. In this sense, negative gossip can be understood as a form of relational aggression (Beersma and Van Kleef, 2012; Ingram, 2014; McAndrew, 2014; Davis et al., 2019) between their senders and targets. It is worth noting that there is a possibility that any given gossip valence can be reciprocated with another valenced gossip. For instance, that receivers of neutral gossip are more likely to reciprocate with positive or negative gossip to its senders. We were not particularly interested in exploring such possibilities here, but they may be useful for future studies when analyzing baseline reciprocity if gossip is defined as a social exchange.

A second structural pattern of networks that we were interested in studying here is the tendency toward closure. There are at least two important theoretical arguments that motivated this. First, the idea that gossip would more easily develop in dense close-knit structures where individuals are able to identify each other (Hannerz, 1967; Merry, 1984; Percival, 2000). Second, from social capital theory (Burt and Knez, 1995; Burt, 2001, 2005, 2008), the argument that closed networks are essential for reputation formation and information flow in social networks. We specifically tested this hypothesis for positive and negative gossip between senders and receivers,

and included parameters as controls in our ERGMs for neutral gossip within the same dyadic relationship. Our results have consistently shown that gossip between senders and receivers is more likely (than expected by chance) to develop in substructures that have a tendency toward closure, across all valences. On the other hand, for senders and targets of negative gossip, we found that this tendency is positive but not statistically significant. This last finding can be evaluated in conjunction with the tendency described for senders and receivers. In particular, it may reflect that reputations are discussed in closed groups about third parties who do not necessarily belong to them. This last claim can be further studied by applying similar methods for multiplex networks as we did in our empirical chapters, by estimating entrainment and exchange effects. That is, whether senders are more likely to gossip about their receivers, and whether their receivers are more likely to gossip about their senders. Following this direction may be of particular interest for organizational studies, as their results may shed light on the possible reasons why some individuals are socially isolated (e.g., Martinescu et al., 2021).

Our second conclusion is that theoretical perspectives on gossip can particularly benefit from an integration based on social exchange theory. We emphasize at least two reasons for this. First, they can easily shed light on some of the social functions of gossip when it is studied in association with other (multiple) relationships. In Chapters 2 and 3, we examined the association between gossip and other relationships. In Chapter 2, our results showed that both positive and negative gossip can strengthen cooperation between its senders and receivers and, in particular, that gossip can be exchanged for nominations as a cooperation partner. In Chapter 3, our results showed that neutral gossip can affectively bond its senders and receivers by strengthening existing affective relationships, which in turn pave the way for neutral gossip between them. These findings have two relevant implications. First, in conjunction with the results of our baseline reciprocity or "repayment in kind" hypothesis in both chapters, gossip is indeed exchanged for other social goods. Second, sharing negative gossip does not necessarily have a negative impact on the sender's reputation.

Second, social exchange theory provides a basis for understanding interdependencies between individuals, which is one of the main points of departure for more recently developed theories in this area, such as the goal-framing theory of gossip (Giardini and Wittek, 2021c; Wittek and Giardini, 2023). Interdependencies are key to understanding the extent to which individuals are willing to gossip with and about others and to refrain from doing so. In Chapter 4, we tested two hypotheses on functional and affective interdependencies between senders and targets of gossip. Our results showed that when individuals are affectively interdependent (e.g., they are friends),

a sender is less likely to gossip about them. In contrast to our prepositions, the same pattern does not hold for functional interdependence, which we operationalized with formal collaboration relationships.

These findings have several implications when are complemented with other results presented in the empirical chapters. First, that affective relationships may be determinants for both sharing and preventing someone from initiating gossip about the person with whom they hold the affection. Second, that functional relationships may be determinants of gossip sharing, but do not prevent someone from being a target, especially from the person with whom one should collaborate in work. Research along these lines would greatly enhance our understanding of gossip and reputation formation and dynamics. Another closely related theoretical argument for further research is the "echo hypothesis" (Burt, 2001). This can be approached by analyzing a negative receiver-target gossip network and testing the hypothesis that the entrainment effect of this network with an affective relationship network (e.g., friendship) is less likely than expected by chance (using ERGMs). In other words, the receiver would be less likely to have received negative gossip about someone who is his or her friend.

Finally, our contribution also extends to identifying the senders and receivers of positive, negative and neutral gossip, and targets of negative gossip in organizations. We were particularly interested in the formal and informal sources of leadership in these contexts (Fernandez, 1991), which have also been of interest in previous research on workplace gossip (e.g., Ellwardt et al., 2012c; Dijkstra et al., 2014; Martinescu et al., 2019a). Our results consistently showed that holding a leadership position was positively associated with being a sender of positive, neutral, and negative gossip. Furthermore, consistent with some studies, holding a formal leadership position was positively related with being a target of negative gossip. For seniority, our results were robust for being more likely to be a sender and receiver of neutral gossip, as well as a sender of negative gossip. These findings provide two relevant insights. First, that gossiping is a widespread activity that is not exclusively practiced by those in lower formal positions. Second, and consistent with previous mechanisms such as the "weapon of the weak" (Scott, 1985, 1990), those in higher formal positions are the main focus of these conversations when their content is negative.

This dissertation, like any research, has certain limitations. The first limitation was due to the cross-sectional nature of our data, which we mentioned in the previous sections of the data description as well as in the three empirical chapters. As we also mentioned above, a challenge for future research on gossip using social network analysis is to collect such data, which will allow disentangling many of the effects

presented here. Second, although we tried our best to integrate the literature, the multiple disciplines and lack of a common framework forced us to combine theoretical and empirical perspectives that are not necessarily aligned. Third, since we used data collected for a specific project, we operationalized our variables using the possibilities offered by the questionnaire. Therefore, we were also limited to using all organizations for the analyses (as mentioned in the sample subsection of this chapter). Last but not least, the generalizability of our findings is another concern because of the small number of organizations we compared in our studies, even though network analysis often advocates case studies. However, what we tried to do in our empirical chapters was to test very detailed mechanisms in associations that are still unclear, at least from a social network perspective. Nevertheless, we encourage further research to contrast some of our findings here.

Finally, besides the previously underlined lines for further research, it is worth mentioning that social network analysis can benefit from other approaches used to study gossip, such as agent-based models (Squazzoni, 2012; Bianchi and Squazzoni, 2015; Renzini et al., 2024) and experiments. In theoretical aspects, it is clear that the challenge still lies in the integration for a unified perspective of gossip and reputation, which some recent studies have given some considerable steps in meta-analyses on the general definition of gossip (Dores Cruz et al., 2021) and workplace gossip (Wax et al., 2022), as well as in the proposal of a goal-frame theory of gossip (Wittek and Giardini, 2023) to achieve this challenge.

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Chapter 2

Gossip and cooperation partners in the workplace. A network study at two Hungarian companies[i]

Abstract: The role of gossip and its informative content in strengthening trust and cooperation in informal relationships among co-workers in organizational settings is still unclear. This article investigates the relationship between gossip and cooperation partners in two companies based in Budapest, Hungary, using a multilayer network model. With individual-level quantitative information and sociometric data on social relationships among all employees, we estimated single and multilayer Exponential Random Graph Models (ERGMs) to test the hypothesis that gossip consolidates cooperation. Our results show that nominations of cooperation partners tend to be reciprocal, and that gossip tends to develop within cohesive social structures, reinforces trust in cooperative relationships, and can promote other instrumental ties that require interpersonal trust, without necessarily negative repercussions on senders' reputation. This suggests that gossip intentionally shared by its senders can provide them with positive externalities, particularly when it requires the trust of its receivers.

Keywords: Gossip; Cooperation; Trust; Networks; Organizations; Multilayer ERGMs.

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2.1 Introduction

The question of how cooperation can emerge and be sustained over time within groups is a key subject of study and debate in the social sciences (Giardini and Wittek, 2019a; Kirgil and Wittek, 2023; Wittek and Giardini, 2023). Empirical research has shown that our species has expanded cooperation among unrelated individuals in larger social groups thanks to reputation and its network transmission (Nowak and Sigmund, 1998, 2005; Wu et al., 2015a, 2016; Takács et al., 2021). Gossip is a specific type of communication that, when developed in a defined setting such as an organization, can be defined as "informal and evaluative talk in an organization, usually among no more than a few individuals, about another member of that organization who is not present" (Kurland and Pelled, 2000: 429). The content of gossip is about someone's reputation (Emler, 1990, 2019; Barkow, 1992; Dores Cruz et al., 2021a). The consequences of these exchanges include not only the formation of the reputation of the person being discussed, but also that of those sending and receiving the information (Noon and Delbridge, 1993; Wittek et al., 2000; Burt, 2001; Foster, 2004; Feinberg et al., 2012; Ellwardt, 2019; Farley, 2019; Dores Cruz et al., 2021b; Estévez, 2021; Takács, 2022).

If trust is an individual's willingness to commit to a relationship without any information about how the other person will eventually behave, including the probability of a future defection, reputation is the extent to which an individual is known to be trustworthy (Burt, 2008). Reputational information shared through gossip facilitates cooperation as it imposes a possible cost to wrongdoers, e.g., ostracism, missing exchange opportunities, defection. However, gossip does not only affect a target's reputation. Gossip can have a positive effect on the reputation of the sender because sharing information about third parties creates, consolidates or expands social connections, thus fulfilling an important relationship-building function (Burt, 2008). In this sense, gossip symbolizes that the receiver is socially closer to the sender than to the target of the conversation. It is a carrier of social intimacy and trust between senders and receivers (Merry, 1984).

At the same time, gossip can negatively affect the sender's reputation because sharing information about third parties can be understood as a negative relational signal, because it can violate pre-existing solidarity norms (Ellickson, 1991), and can have negative externalities in situations of functional interdependence (Giardini and Wittek, 2019b). Indeed, despite its prevalence in all human societies, sharing information about third parties has been morally condemned in various cultures (Goodman and Ben-Ze'ev, 1994; Beersma and Van Kleef, 2012; Peters and Kashima, 2015). The unsolved puzzle is understanding under what conditions individuals who share repu-

tational information through gossip can stimulate trust-based relationships, such as cooperation, and which type of gossip is instrumental to establish trust without incurring in possible negative implications. In particular, we want to focus on the extent to which individuals share gossip with others with whom they would like to cooperate or, in exchange, receive nominations as desirable cooperation partners from their receivers. To address this puzzle, we followed "social exchange theory" (SET) in that we focused on the reconstruction of a series of mutual obligations between exchange partners in a dense context of informal and formal roles (Blau, 1964; Cropanzano and Mitchell, 2005; Molm et al., 2007).

This article aims to contribute to the debate on the sustainability of group cooperation by empirically studying the effect of gossip on the nominations as cooperation partners in two groups of individuals working in a software development and public administration organizations in Budapest, Hungary. The data collection was conducted in 2016-2018.

Organizations are an ideal setting to study the relationship between gossip and cooperation. These contexts offer a well-defined set of relationships, roles, and processes that facilitate the reconstruction of gossip dynamics (e.g., Noon and Delbridge, 1993; Wittek and Wielers, 1998; Kurland and Pelled, 2000; Grosser et al., 2010; Michelson et al., 2010; Ellwardt, 2011; Estévez et al., 2022b). Gossip has been empirically shown to play positive roles for norm compliance within groups (Kniffin and Wilson, 2005, 2010), and to be positively associated with the development of other types of ties (Takács et al., 2021), such as solidarity (Hodson, 1993), interpersonal trust (Burt and Knez, 1995; Burt 2001; Van de Bunt et al., 2005; Ellwardt et al., 2012b), friendship (Jaeger et al., 1994; Ellwardt et al., 2012a), instrumental relationships (Grosser et al., 2010), popularity, and positive reputations (Mehra et al., 2006). Furthermore, for the specific interest of our study, formal organizations offer special contexts for cooperation, given their purpose of joint production, predefined hierarchies, and the implication of some kind of reward in exchange for members' efforts (Wittek and Giardini, 2023). Peer cooperation is crucial not only for the production of collective goods in the organizational environment, but also for successfully carrying out assigned tasks (Wittek et al., 2000) as uncovering cheating or trustworthy tendencies in co-workers help to self-regulate collaboration (McAndrew et al., 2007).

The settings of our study provided us with the opportunity to observe: (1) the structure of informal exchanges of third-party reputation information among coworkers (i.e., positive and negative gossip networks between senders and receivers); and (2) the structure of cooperation partners, based on the formal structure of cooperation and other work-related relationships (i.e., cooperation partners network).

We analyzed the multilayer network of gossip and cooperation partners among the workers. We focused on dyads representing the gossip's senders and receivers. This dyad has received less attention in the literature, compared to the experimental research on the reputational consequences on receiver-target dyads (cf., Samu et al., 2020; Samu and Takács, 2021). Additionally, we differentiated gossip according to the valence of the evaluation. More specifically, we considered whether information exchanges between workers conveyed positive, or negative content. We introduced and tested our hypotheses for both separately to provide a more detailed view of the association between gossip and cooperation. Therefore, we examined how the structures of positive and negative gossip between senders and receivers had any consequences on both parties being nominated as "cooperation partners".

Our results suggest that positive and negative gossip and nominations as cooperation partners dynamics can be explained by considering endogenous structural factors and cross-network effects. For positive and negative gossip, we show that it tends to emerge in close-knit structures. Second, we show that it is more likely for individuals to gossip negatively with others if they would also nominate them as cooperation partners. This suggests that negative gossip between senders and receivers may reinforces underlying trust in their cooperative relationships. Third, we show that individuals are more likely to gossip positively and negatively with other if the latter nominate the former as a cooperation partner, thus indicating that gossip can foster or consolidate other instrumental ties that require interpersonal trust. Therefore, gossiping does not necessarily entail negative reputational consequences for senders, as signaling theory has suggested. Indeed, signaling theory postulates that gossip has a negative impact on the sender's reputation as it carries information on intentions, thus potentially revealing maliciousness and dishonesty, which can damage cooperative relationships with receivers and third parties (Giardini and Wittek, 2019a).

The rest of the paper is organized as follows. Section 2 presents the background of our research and the hypotheses being tested. Section 3 describes the data collection and the methods used for data analysis. Section 4 presents the results and contrasts them with the hypotheses. Section 5 discusses the main findings, comments on limitations, and proposes future research agenda avenues.

2.2 Research background and hypotheses

2.2.1 Social exchange theory

Social exchange theory (SET; for classical references, see Blau, 1964; Cropanzano and Mitchell, 2005; Molm et al., 2007) provides a broad conceptual framework for analyzing relationships involving social goods such as cooperation (Cook et al., 1993; Flache, 2004) and gossip (Rosnow, 1977, 2001). According to this perspective, individuals engage in sequential interdependent transactions that create obligations between the exchange parties (Mitchell et al., 2012). These exchanges are governed by certain rules or norms, of which reciprocity is the most basic and fundamental (Cropanzano et al., 2007). This means that the actions of one actor lead to responses from the other, usually in the form of reciprocal actions or "repayment in kind" (Cropanzano and Mitchell, 2005; Martinescu et al., 2019). Through these reciprocal exchanges, individuals build relationships based on trust and commitment (Homans, 1961; Blau, 1964). Although there are several variations of social exchange, most models share common features that may explain the development of relationships. First, an actor's initial treatment toward another individual. Second, the reciprocal responses to the action. Third, the formation of relationships between them (Cropanzano et al., 2007). In addition to norms, it is important that the benefits outweigh the costs for all actors involved to explain their willingness to engage in social exchange (Baldwin, 1978; Molm et al., 1999).

The social exchange approach to interpersonal relationships has been applied to gossip (Rosnow, 1977; Rosnow, 2001; Martinescu et al., 2019). The central argument is that there is a correspondence between gossip norms and economic exchange principles (Rosnow, 1977). The value of gossip in the social exchange market derives from the many functions it can serve (Rosnow, 2001). In this context, gossip is defined as "small talk" with social purpose, constituting "a valuable social commodity" (Rosnow, 1977). Gossip represents an instrumental transaction in which the sender and receiver exchange informal dialogues about the subject in question in exchange for some valuable (material or symbolic) resource. This could be more gossip, status, fun, money, social control, or any material or psychological stimulus capable of satisfying preconditioned needs, desires, and expectations (Rosnow, 2001).

To support this position, Rosnow (1977) compared three patterns of trading practices identified by Polanyi, Arensberg, and Pearson (1957). The first, redistributive trading, denotes the situation in which resources are brought to a central operation and from there fairly dispersed. Gossip works in the same way when it is shared with

the intention to inform others, allowing them to make social comparisons and gain a better understanding of their social environment (e.g., Wert and Salovey, 2004). The second, exchange, is the case where the value of a commodity results from negotiations to gain some economic advantage. For gossip, this situation is manifested when it is used with the purpose to influence the decisions of others. Examples of this scenario are particularly salient in experiments inspired by game theory, where individuals use reputational information to make cooperative decisions (e.g., Sommerfeld et al., 2007; Sommerfeld et al., 2008) or to select partners for cooperation (e.g., Bravo et al., 2012). The third, reciprocative trading, refers to the situation in which goods and services are given and received in an equitable ratio or balanced reciprocity. For gossip, this occurs when it provides entertainment to those who share it (e.g., Gambetta, 1994), even though the shared information may harm a third party.

This approach has also been applied to cooperation. For instance, Lawler and Yoon (1993, 1996, 1998) have empirically shown that cooperative agreements can foster commitment among the parties involved. Repeated and successful exchanges produce positive affection, leading to the development of relationships based on commitment and trust (Lawler and Yoon, 1993; Lawler and Thye, 1999; Molm, 2003). There are two essential elements for exchanges to develop into reciprocal relationships (Lawler, 2001). First, the parties must share responsibility for the outcomes of the task being performed. Second, they must share a sense of responsibility for the results of the exchange agreement. In summary, negotiated exchanges evolve when each party's outcomes depend on the other's outcomes through mutual cooperation and awareness of the consequences of the exchange (Mitchell et al., 2012).

According to social exchange theory, one might expect both gossip and nominations of collaborators to tend toward reciprocity. This implies two assumptions. First, gossiping is a common activity among group members, even though it is socially condemned. Second, individuals with whom one must work on a daily basis are committed to complying with the social norms established by the organizations. Here, we specifically attempt to test whether reciprocity between senders and receivers of positive and negative gossip is more likely than expected by chance.

Hypothesis 1. Positive and negative gossip between senders-receivers are more likely to be reciprocated with positive and negative gossip, respectively, than expected by chance.

2.2.2 Gossip as exchange in social networks

Social interactions are embedded in networks that determine the likelihood with which two people meet, interact, and exchange information. Therefore, the structure of a network can influence the likelihood that two people will gossip or decide to cooperate with each other. Network topologies and their characteristics, such as how segmented, dense, cohesive, or centralized they are, could greatly facilitate or hinder the emergence of cooperation by limiting interactions or information transmission (Takács et al., 2021). Empirical research has shown that the occurrence of workplace gossip is largely determined by certain structural factors (Ellwardt et al., 2012a; Ellwardt et al., 2012b; Estévez and Takács, 2022). Similarly, by the type of relationship that individuals engaging in gossip hold (i.e., if they are friends, or if they have an instrumental relationship). Analytically, gossip can be represented in a triad, known as the "gossip triad" (Wittek and Wielers, 1998; Ellwardt, 2019). This triad can be divided into dyads that respectively capture the relationships between senders and receivers, senders and target, and receivers and target. Here, we will focus solely on sender-receiver dyads, which in simple terms captures who gossips with whom.

One of the basic structural properties of social networks that has been associated with the development of gossip is density. In theory, if the density of the network of interactions among group or community members is higher, gossip could function effectively as a social control mechanism (Enquist and Leimar, 1993; Dunbar, 2004). Explanations for this mechanism suggest that gossip could help individuals to better understand their environment (Baumeister et al., 2004), facilitate the comparison or contrast of social information (Suls, 1977; Wert and Salovey, 2004), and allow for the establishment and maintenance of shared expectations and behavioral norms (Gluckman, 1963; Bergmann, 1993; Noon and Delbridge, 1993; Dunbar, 2004). Anthropological studies on gossip have provided similar explanations about this network property. More specifically, that gossip would more easily develop in dense close-knit structures where individuals are able to identify each other (Hannerz, 1967; Merry, 1984; Percival, 2000).

A second perspective on network structures in the dissemination of reputational information is found in social capital theory (Burt and Knez, 1995; Burt, 2001, 2005, 2008). The central argument is that closed networks are essential for reputation (e.g., Granovetter, 1985; Coleman, 1988). A network is closed to the extent that the people in it have strong ties with each other or can be indirectly reached through strong ties with mutual contacts. As connections close the network, individuals become more informed about one another and calibrate their opinions with respect to others. In

this sense, the closed network makes the cost of reputation a credible threat within the network. In order to preserve reputations among colleagues who are well informed about each other's behavior, individuals are careful to behave correctly, thereby reducing the risk of trusting colleagues within the network (Burt, 2005).

Wittek and Wielers (1998) tested three different social structures that could potentially explain the occurrence of gossip in six school classes and six work organizations. They made three important assumptions: (1) individuals seek to maximize their status; (2) receivers value information more when they know the target personally; and (3) receivers value information more when it is difficult to verify. The first triad was *coalition*. In this triad, the sender and receiver have a good positive personal relationship, and both have a negative relationship with the target. The second triad was *constraint*. In this triad, only the sender has a relationship with the receiver and the target. The constraint triad is based on the structural hole argument (Gould and Fernandez, 1989; Burt, 1992). Finally, the third triad was *closure*. This is based on the argument that closed triads favor the flow of information and have a positive effect on group formation and stability. In this triad, all actors have positive relationships, and the sender and receiver share normative information that allows them to strengthen their relationships. This implies that the costs of gossiping are low, and that gossip is widely practiced within groups because it provides them with functional benefits. The results of this study showed that the coalition triad was the one that better explained the occurrence of gossip (cf., Estévez et al., 2022a).

A third useful perspective for understanding how reputations are transmitted in social networks can be found in studies of information diffusion in networks (Centola, 2018). For example, it has been theorized that a single source of information may not be sufficient for reputational information to be effectively transmitted to others. This means that reputational information may be a "complex contagion" (Centola and Macy, 2007) because it requires multiple sources of confirmation (i.e., social reinforcement) for being believed and potentially used. According to this approach, networks with high triadic closure, clustering, and strong ties should facilitate complex contagion compared to networks with open triads or structural holes, low clustering, and weak ties. The former allow for cross-verification and information updating (Guilbeault et al., 2018; Samu and Takács, 2021).

Taken together, these perspectives suggest that dense, closed network structures have some influence on the occurrence of gossip. If gossip is a widespread practice among individuals (Dores Cruz et al., 2021a), and tends to develop easily in dense closed structures, one might expect that in the networks of gossip there would be a greater number of closed configurations (triangles) than would be expected by chance.

Hypothesis 2. Positive and negative gossip between senders-receivers are more likely to take place in close-knit structures (i.e., highly cohesive structures), than expected by chance.

One condition that may favor gossip exchanges between the sender and the receiver, is the presence of a positive relationship between them (Coleman, 1990; Bergmann, 1993; Gambetta, 1994; Burt, 2001; Borgatti and Foster, 2003; Takács et al., 2021). Senders communicate with others whom they believe would interpret the disclosed behaviors similarly or would share an equal belief about the situation discussed (Burt, 2005). Gossip senders require that their content be kept secret by their receivers (Burt and Knez, 1995; Ellwardt et al., 2012b; Ellwardt, 2019; Fan et al., 2021; Fan and Dawson, 2022). If this is not ensured, the sender might choose to refrain from gossiping to avoid being perceived as a deterrent or to not violate the solidarity with the target (Ellickson, 1991; Giardini and Wittek, 2019b). If the conversation is leaked, the sender could be socially punished and thus damage their reputation. Interpersonal trust is the relationship that reduces the chances of gossip being leaked by the receiver (Burt, 2005). However, in an empirical study on a medium-sized Dutch non-profit organization, Ellwardt, Steglich, and Wittek (2012) have shown that gossip can take place without any prior friendship, and that trust can be established through gradual information exchanges that are instrumental to develop social relationships over time.

Interpersonal trust and commitment to the organizational environment can be fostered by friendly relationships or frequent interactions with colleagues (Nooteboom, 2002; Erdogan and Enders, 2007; Grosser et al., 2010). Regular contact among individuals mitigates the risk of exploitation by the trusted party, as there is the potential for repercussions in case of deception in future interactions. Trust is thus grounded in the anticipation of reciprocal behavior within the relationship. Experimental research in social sciences has consistently shown that this effect, known as "the shadow of the future," is influential in promoting cooperation (Axelrod, 1984; Van Lange et al., 2011; Wu et al., 2015b). Gossip is a conducive situation for nurturing such regular interactions, fostering interpersonal trust through a sense of mutual obligation (Giardini and Wittek, 2019b). Positive interactions over time facilitate the development of social support and trust within relationships (Marsden and Campbell, 1984; Gambetta, 1988; Wellman and Wortley, 1990; Ellwardt et al., 2012b).

Two approaches have examined sender and receiver dyads of gossip, each offering different predictions about the expected outcomes for cooperation. On the one hand, from a "social bonding" perspective, the underlying motive for cooperation may be to obtain any material or affective benefits through social relationships (Dunbar, 2004;

Van de Bunt et al., 2005; Giardini, 2012; Giardini and Wittek, 2019a; Samu and Takács, 2021). Gossip could strengthen the cooperative relationship between senders and receivers at the expense of cooperation with third parties, as shared information might harm the reputation of the individual being discussed (Shaw et al., 2011; Wittek and Wielers, 1998). For instance, Estévez, Kisfalusi, and Takács (2022) showed that friends coordinate the reputational evaluations of others, because any difference in the reputations attributed to others does not hinder senders from gossiping about them.

On the other hand, from a "social control" perspective, gossip is associated with the production of and compliance with group norms (Gluckman, 1963; Ellickson, 1991; Kniffin and Wilson, 2005; Giardini and Conte, 2012). What drives individuals to gossip is the existence of shared expectations about the fulfillment of group norms. When these expectations are not met, there is a regulatory interest in sanctioning violators (Coleman, 1990). Gossip would serve as a coordination mechanism for senders and receivers, influencing the willingness to impose sanctions on the third party (Giardini and Wittek, 2019a). Furthermore, they encourage actions that are functional in achieving the goals and objectives of the group (Giardini, 2012; Takács, 2022).

Finally, the theoretical relationship between trust and cooperation in social interactions has been extensively demonstrated in the experimental literature and by studies using agent-based models (Berg et al., 1995; Fehr and Fischbacher, 2003; Keser, 2003; Seinen and Schram, 2006; Boero et al., 2009a, Boero et al., 2009b; Buskens et al., 2010; Buskens and Raub, 2013; Bravo et al., 2015). For instance, Bravo, Squazzoni, and Boero (2012) have shown that cooperation would be fostered by individual abilities to select cooperation partners based on trust, thus allowing cooperators to isolate defectors. In this sense, the ability to select partners is a mechanism by which individuals could decrease the risk of being defected in cooperative situations by making defection less profitable, while providing an incentive for partners to be trustworthy to avoid social isolation. These findings are consistent with research on gossip and the potential for selecting cooperation partners (e.g., Giardini and Conte, 2012; Giardini et al., 2021), emphasizing the significance of trustworthiness in reputational information shared among individuals (Giardini, 2012; Smith, 2014; Milinski, 2019; Testori et al., 2022).

In our study, we investigated the structural mechanisms that can make cooperation between partners sustainable depending on the fact that they also share gossip. The existence of a trust relationship between partners can be reinforced with gradual exchanges of information about third parties, regardless of their emotional or instru-

mental implications. Moreover, gossip is likely to be shared among individuals who have shared expectations about group norms. The ability to select reliable cooperation partners is contingent upon the reciprocal fulfillment of social expectations. Gossip can aid in the selection of cooperative partners in two distinct ways. First, senders could share information to confirm whether both parties still share expectations about a situation, observing receivers' reaction to maintain existing relationships. Second, senders could implicitly signal their own expectations to receivers, gradually building trust to develop a relationship. Social reinforcement effects are particularly important in situations involving risk (Centola and Macy, 2007; Centola, 2018), such as selecting cooperative partners. Therefore, it is expected that individuals would be inclined to gossip with co-workers they also nominate as cooperation partners.

Hypothesis 3. Individuals are more likely to gossip positively and negatively with others they also nominate as cooperation partners, than expected by chance.

According to Rosnow (1977, 2001), gossip can be compared to an exchange pattern of trading practices (Polanyi et al., 1957) when its function is to influence others. Through the exchange of gossip, individuals can gain access to other social goods (Fine and Rosnow, 1978; Martinescu et al., 2019). During the development of conversations, it is possible to convey signals of trust and interest in establishing lasting relationships (Bosson et al., 2006). Gossip can be used to evaluate the trustworthiness of existing and potential relationships, as it helps to identify those who may disappoint and potential allies or sources of social support. In this sense, norms play a fundamental role in preventing and reducing deception in group interactions by limiting the actions of those who do not comply with them (Ellwardt et al., 2012a).

On the other hand, reputations that are transmitted through gossip can indicate the position of an individual within a social network (Hannerz, 1967; Burt and Knez, 1995; Burt, 2001; Foster and Rosnow, 2006; Kisfalusi et al., 2019; Hartung et al., 2019; Estévez and Takács, 2022). With respect to the sender, their position and connections within the network determine their ability to communicate and compare receivers' reactions to information about third parties (Ellwardt et al., 2012a), including whether receivers share similar views on the behaviors discussed. The number of connections an individual has in a network can also serve as a means of identifying opportunities to promote a positive reputation (Wu et al., 2015a). In this sense, the quantity and quality of the information shared shape an individual's reputation.

For instance, it has been shown that gossip senders acquire a moral reputation when they share information that provides a sufficient basis for identifying targets as trustworthy or untrustworthy (Peters and Kashima, 2015). Thus, gossip not only

influences the reputation of targets in a social network as "good" or "bad" interaction partners. Senders in a network can also acquire a reputation as trustworthy or untrustworthy information providers (Takács et al., 2021). Gossip can be utilized by the sender as a way of signaling access to information they possess, which can improve their reputation and make them an attractive exchange partner (McAndrew and Milenkovic, 2002). Conversely, it has been shown that individuals with recurrent gossiping tendencies may face negative reputational consequences and negatively affect group cooperation (Wittek et al., 2000).

Based on social exchange theory, we argue that gossip can facilitate the establishment of cooperative relationships between individuals. It is expected that receivers of gossip will interpret it as a signal of trustworthiness on the part of the sender. If the receiver reacts positively to the information, it indicates that they share similar expectations about behavior and compliance with group norms. This reaction could potentially lead the receiver to nominate the sender as cooperation partner. Therefore, we hypothesize that gossip by a sender would be reciprocated with a nomination as cooperation partner by the receiver. Favorable evidence on this hypothesis could also help us to discuss the potential negative effects of gossip behavior on the sender's individual reputation.

Hypothesis 4. Positive and negative gossip between senders-receivers is more likely to be exchanged with a nomination as a cooperation partner, than expected by chance.

2.3 Research design and method

To test our hypotheses, we used data from a comprehensive network study (EVILTONGUE) of two groups of subjects who worked in public administration and software development organizations based in Budapest, Hungary (hereafter *Unit A* and *Unit D*). The data comprised of a set of relational and individual dimensions of all workers collected in 2016 and 2018[1]. See Chapter 1 for more information on the EVILTONGUE project.

[1]The Hungarian Academy of Sciences - Centre for Social Sciences 'Lendület' Research Center for Educational and Network Studies (RECENS) carried out the EVILTONGUE project, led by Károly Takács. The data was collected as part of this project by Boróka Pápay and Eliza Bodor-Eranus. The project received funding from the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation programme (grant agreement N. ERC/648693).

2.3.1 The empirical settings

At the time of the fieldwork, Unit A, which operated in the public administration sector, had a clearly defined organizational structure, with small internal teams working together on specific tasks. Staff responsibilities included writing project proposals and managing finances for other sector institutions. These tasks were constantly changing, so the organization was restructured accordingly. Six workers coordinated and managed these tasks. On the other hand, Unit D, part of a software development organization, had several internal teams collaborating on specific tasks. Their customers were international, and they had no local competitors. Employees were responsible for different areas, including sales, marketing, administration, and finance, requiring diverse skills. Six workers coordinated and managed these tasks.

2.3.2 Qualitative fieldwork

After gathering information about the formal and informal relationships within these units, the researchers conducted a qualitative study of each work environment[2]. This was done to gain an in-depth understanding of these organizations' position in their sectors, their internal policies and dynamics, employee practices, and available resources. This approach provided a complete picture of the culture of these companies. Semi-structured interviews were conducted with human resources specialists and managers to gain insight into the organizations' personnel. The interviewees provided information on their hiring processes, performance evaluation methods, years of experience within the organization, salary levels, and positions held by employees.

In Unit A, two-thirds of the team were women, and out of the six managers, four were also women. Most of these individuals had professional backgrounds in administration and social work. The work they were doing was highly dynamic, with constantly changing tasks, leading to considerable pressure and stress on the workers. This was reflected in high turnover, either through dismissal or resignation due to the demands of the job. New members were selected based on the basis of performance or experience in similar previous roles. The organization did not provide recreational spaces or additional events beyond work for its employees. Relationships among workers were cordial but formal, and they rarely spent time together outside of working hours.

In Unit D, workers generally expressed satisfaction with the work environment. In terms of internal dynamics and relationships among workers, most had good rela-

[2]For more information on the information given here, see the work of Pápay (2021).

tionships, although some experienced social isolation. Workers had access to common areas such as a gym and cafeteria. The flexibility of the vacation policy was noteworthy, as was the availability of a day care center for employees' children. Voluntary turnover was minimal in the period prior to the data collection. In this group, two-thirds of the team were men, and out of the six managers, five were also men.

2.3.3 Data and variables

Survey

Relational and individual data were collected through self-administrated computer-based questionnaires. The process was supervised on site by researchers from the EVILTONGUE project. The survey was designed in a customized web-based application, which simplified the monitoring and cleaning of the information. The survey lasted approximately 45 minutes. The response rate was 100%. The questionnaires were administrated in Hungarian (general information about the survey can be found in Chapter 1, and English translations of the sociometric information used in this study can be found in Appendix B.1.).

Individual-level data were collected to control for the interaction between the properties of the company's employees and their relationships with each other. The data collected included individual attributes such as age, gender, educational level, and years of experience in the organization. Table 1 summarizes the main characteristics of the respondents.

Table 1. Respondents' main characteristics

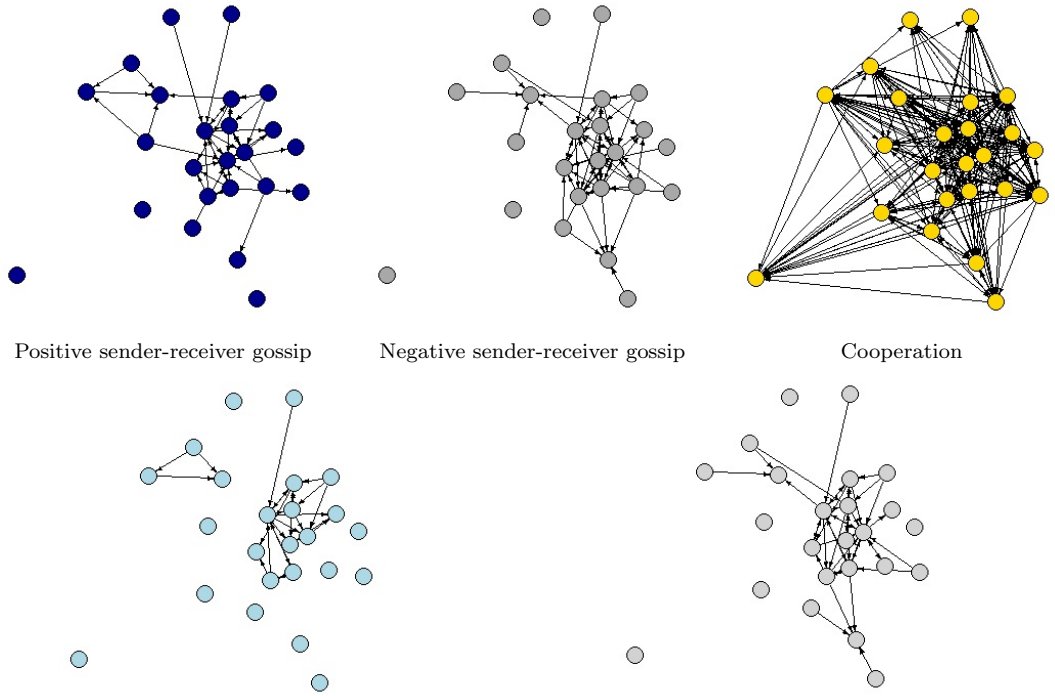
Unit	A	D
Number of workers	24	18
Gender	Female = 18; Male = 6	Female = 6; Male = 12
Age (years)	Mean = 37.7 (S.D. = 7.6)	Mean = 39.4 (S.D. = 10.7)
Age (range)	[25, 55]	[25, 64]
Managers	6	6
Female managers	4	1
Seniority (years)	Mean = 2.88 (S.D. = 1.03)	Mean = 4.8 (S.D. = 4.8)
Seniority (range)	[2, 6]	[1, 17]

Variables

Relational data were collected using the roster method. For each network, respondents were able to select colleagues by typing in their names in the software (assisted with an auto-complete option) and nominate those with whom they interacted according to the statement. This method was used to identify the individuals with

whom the respondents had relationships. The data were organized into binary adjacency matrices. Each cell X_{ij} represented the relationship between individual i and j. For instance, if i identified j as someone with whom she cooperates, the corresponding cell X_{ij} in the cooperation matrix was coded as 1; otherwise, it was coded as 0. Each matrix contained all possible combinations of pairs of individuals. Gossip relationships (positive, and negative) and nominations as cooperation partners are the co-dependent variables in this study, as depicted in Figures 1 and 2 for each unit, respectively.

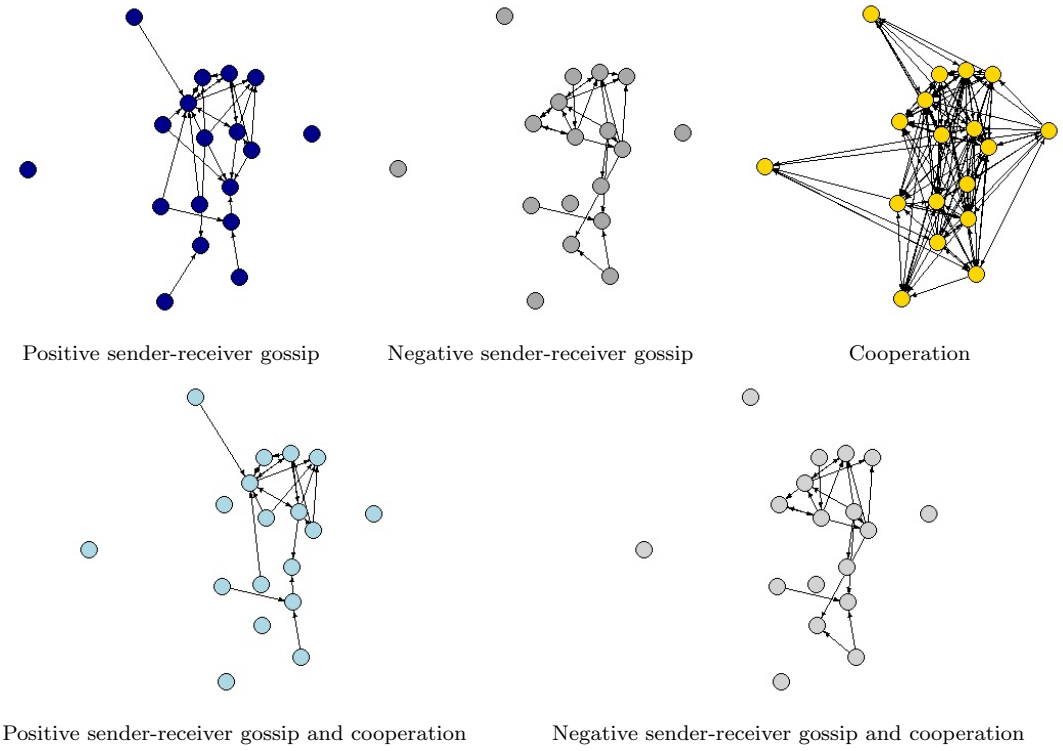
Figure 1. Networks graphs – Unit A



Positive and negative sender-receiver gossip networks

Information about positive and negative gossip between senders and receivers was obtained by means of two questions. First, respondents were asked to identify peers who had shared personal information about another colleague in the past three months. This permitted to identify gossip senders based on the receiver's perspective. This way of reporting gossip relationships based on the receiver has the advantage of being more accurate, as self-reported gossip is more likely to be underreported because it is considered an undesirable behavior (Nevo et al., 1994), i.e., gossip is negatively cor-

Figure 2. Networks graphs – Unit D



related with social desirability (Litman and Pezzo, 2005). Second, they were asked about the type of information received, whether it was positive, neutral, or negative. This allowed us to create different binary matrices for positive and negative gossip between senders and receivers. Then, in each matrix, we defined cell X_{ij} to 1 if individual i shared positive or negative personal information about another colleague with j in the last three months, and 0 otherwise.

Cooperation partners networks

The nominations as cooperation partners were obtained by combining responses to two distinct questions: one related to the structure of formal cooperation, which, although imposed by the organization, was freely reported by the respondents, and another about the desire not to cooperate with someone at all. Thus, we defined cell X_{ij} as 1 if individual i indicated that have to cooperate with j due to its work duties and, in addition, i did not express a desire not to cooperate with j at all; otherwise, $X_{ij} = 0$. Thus, our network captures with whom an individual wishes to maintain the cooperation imposed by the organizational structure, implying an

instrumental relationship. For the sake of simplification, we will refer to this network as cooperation partners.

Descriptive statistics

Table 2a and 2b presents descriptive statistics of positive and negative sender-receiver gossip, and cooperation partners networks. Overall, it stands out that sender-receiver gossip networks were not dense. The least dense network was the positive sender-receiver gossip network from Unit A (7.3%), and the densest was the negative sender-receiver gossip network of the same group (11.1%). The standard deviations of the ties sent and received (Std. dev. in-/out-degree) suggest that there were variations in the number of coworkers with whom individuals gossiped within these organizations. Some of these differences are more noticeable when observing the distribution of in-/out-degree ties according to (years of) *seniority* in the organization and holding a *manager* position. Figures 3 to 10 in Appendix B.2. of this paper respectively present these distributions.

The in-/out-degree centralization values also allowed us to understand the development of different types of gossip. For instance, positive gossip among these groups of workers tended to be received by a smaller number of individuals compared to those who sent it (i.e., in-degree centralization was higher than out-degree centralization in the positive sender-receiver gossip networks). There was no pattern for negative gossip.

Table 2a. Networks descriptive statistics (Unit A, n = 24)

	Positive S-R gossip	Negative S-R gossip	Cooperation
Ties	40	61	300
Density	0.073	0.111	0.543
Mean In-/Out-degree	1.667	2.542	12.500
Std.dev. In-degree	2.120	2.949	2.687
Std.dev. Out-degree	1.685	2.734	7.144
In-degree centralization	0.287	0.293	0.250
Out-degree centralization	0.197	0.248	0.476
Reciprocity	0.200	0.393	0.667
Transitive triads (030T)	8	7	85
Cyclic triads (030C)	0	0	5

Considering some of the statistics relevant to our hypotheses, reciprocity between senders and receivers was higher in the negative gossip network (39.3%) than in the positive gossip network (29.2%) for Unit A. For Unit D, there were no differences in the percentage of mutual connections, with an approximately 26% in both sender-receiver gossip networks. Reciprocity in cooperation partner networks were noticeable

Table 2b. Networks descriptive statistics (Unit D, n = 18)

	Positive S-R gossip	Negative S-R gossip	Cooperation
Ties	30	23	155
Density	0.098	0.075	0.507
Mean In-/Out-degree	1.667	1.278	8.611
Std.dev. In-degree	2.301	1.487	3.363
Std.dev. Out-degree	1.645	1.602	3.483
In-degree centralization	0.394	0.170	0.336
Out-degree centralization	0.208	0.232	0.398
Reciprocity	0.267	0.261	0.684
Transitive triads (030T)	3	3	17
Cyclic triads (030C)	0	0	5

higher than in sender-receiver gossip networks for both units (Unit A: 66.7%; Unit D: 68.4%).

Tables 3a and 3b show the number of ties entrained and exchanged between these networks. For instance, in Unit A, of the 40 positive gossip ties sent from i to j, 25 were entrained and 28 were exchanged with a nomination as cooperation partner from j to i. For negative gossip, of the 61 ties, 43 were entrained and 46 were exchanged. In Unit D, of the 30 positive gossip ties, 22 were entrained and 28 were exchanged with a nomination as cooperation partner. For negative gossip, of the 23 ties, 21 were entrained and 21 were exchanged with a nomination as cooperation partner.

Table 3a. Number of entrained and exchanged ties between positive and negative sender-receiver gossip and cooperation partners networks in Unit A.

	Cooperation partners	
	Entrained	Exchanged
Positive S-R gossip	25	28
Negative S-R gossip	43	46

Table 3b. Number of entrained and exchanged ties between positive and negative sender-receiver gossip and cooperation partners networks in Unit D.

	Cooperation partners	
	Entrained	Exchanged
Positive S-R gossip	22	28
Negative S-R gossip	21	21

2.3.4 Analytical strategy

Our hypotheses are divided into two sets, each requiring different empirical approaches that belong to the same family of statistical models for inference in social network analysis (i.e., one is an extension of the other). On one hand, we wanted to study the structural logic (Markovsky et al., 1988; Rank et al., 2010) of the positive and negative

sender-receiver gossip networks, without considering the effects of multiplexity as part of its generative process (Hypotheses 1 and 2). For this, we estimated Exponential Random Graph (p*) Models (ERGM) for each single network (Lusher et al., 2013).

On the other hand, we wanted to investigate the cross-layer effects between positive and negative sender-receiver gossip networks with cooperation partners networks (Hypotheses 3 and 4), which required the extension of ERGMs for multilayer networks (Lazega and Pattison, 1999). Detailed forms and explanations of the statistical models used here can be found in Chapter 1.

ERGMs specification

In the ERGMs (see Table 4, Model 1), we separately estimated the occurrence of observed positive and negative sender-receiver gossip networks. This was for two reasons: (1) it allowed us to analyze the structural logic of our networks, and (2) it enabled us to test our first two research hypotheses. In the first, we postulated that positive and negative gossip between senders-receivers were more likely to be reciprocated with positive and negative gossip, respectively, than expected by chance. We operationalized this hypothesis through a reciprocity effect. In our second hypothesis, we postulated that positive and negative gossip between senders-receivers were more likely to take place in close-knit structures (i.e., highly cohesive structures), than expected by chance. Specifically, we operationalized this hypothesis through the simultaneous effect of two substructures that signal if there was a tendency towards closure (Holland and Leinhardt, 1971, 1976; Burt, 2005) within our positive and negative sender-receiver gossip networks. A positive effect of transitivity (indicating a high degree of closure or multiple triangles in the data) and a negative effect of multiple connectivity (referring to the number of 2-paths in the network) indicate that indeed 2-paths tend to be closed or form triangles (Robins and Lusher, 2013: 175). For transitivity we used a network statistic known as geometrically weighted edgewise shared partnerships (*gwesp*), and for multiple connectivity we included a geometrically weighted dyadwise shared partnerships (*gwdsp*) statistic. Both parameters were defined with a decay parameter equal to 0.5.

Besides the three mentioned parameters, we included three exogenous effects (*actor-relation effects*) that capture the tendency to receive (*popularity*) and send (*activity*) positive and negative gossip ties among the actors with certain characteristics. For the attribute of being a *manager* used two different effects to assess these tendencies. However, given the limitations of the package used for our estimates, we were able to employ only a single parameter to jointly assess the tendency to-

wards popularity and activity for *seniority*. We controlled for *manager* and *seniority* because both factors are sources of leadership in organizations (Fernandez, 1991). Individuals in higher formal positions within an organization have been of particular interest in gossip studies (e.g., Ellwardt et al., 2012b; Dijkstra et al., 2014; Martinescu et al., 2019).

In the multilayer ERGMs (see Table 3, Model 2 to Model 4), we simultaneously estimated the co-occurrence of the observed positive and negative sender-receiver gossip networks with the cooperation partners networks. We assumed that the formation of these networks was an endogenous process. This choice reflected the cross-sectional nature of our data and was more coherent with the content and formulation of the questions. For gossip, we referred to information transmitted during the last three months. For the nominations as cooperation partners, although the original question was not framed within a defined period, task assignment was clearly established within the company, and the desire not to cooperate with someone implicitly suggested that respondents reflected on past and present situations.

These multilayer exponential random graph models allowed us to test our third and fourth hypotheses. In the third hypothesis, we postulated that individuals were more likely to gossip positively and negatively with others they also nominated as cooperation partners, than expected by chance. In the fourth hypothesis, we stated that positive and negative gossip between senders-receivers was more likely to be exchanged with a nomination as a cooperation partner, than expected by chance. We formalized our hypotheses in our model by including an effect known in the literature as "entrainment" (Wang, 2013: 115), which represents the extent to which the two network ties align within the dyad (i.e., both ties are directed from i to j), for hypothesis 3; and we considered an "exchange effect" (Wang, 2013: 115), which represents the extent to which the dyad exchanges ties of different types[3] (e.g., gossip from i to j, and nomination as cooperation partner from j to i), for hypothesis 4[4]. The parameters used for each individual layer were the same, except that we did not include the multiple connectivity parameter in the cooperation partners network.

[3] In our models, this parameter can also be interpreted in the reverse direction, i.e., is a "viceversa" effect. That is, it also represents the scenario in which i nominated j as a cooperation partner, and j gossiped to i.

[4] These two effects have also been referred to with other names in the literature. For instance, as out-degree multiplex and reciprocity multiplex (e.g., Ellwardt et al., 2012a), or by the names with they can be used in a software, like XPNet, as ArcAB and ReciprocityAB (see Wang, 2013).

Table 4. Parameters included in ERGMs and Multilayer ERGMs. All these models are replicated for positive and negative gossip between senders and receivers by Unit.

Parameter	Model 1	Model 2	Model 3	Model 4
S-R gossip				
Arc	X	X	X	X
Reciprocity	X	X	X	X
Transitivity	X	X	X	X
Multiple connectivity	X	X	X	X
Manager (receiver)	X	X	X	X
Manager (sender)	X	X	X	X
Seniority	X	X	X	X
Cooperation partners				
Arc		X	X	X
Reciprocity		X	X	X
Transitivity		X	X	X
Manager (receiver)		X	X	X
Manager (sender)		X	X	X
Seniority		X	X	X
Cross-layer effects				
Entrainment		X		X
Exchange			X	X

Table 4 illustrates the parameters included for the estimation of each of our ERGMs. We estimated our models using the Monte Carlo Markov Chain Maximum Likelihood Estimation (MCMCMLE) method (Snijders et al., 2006) with the *ergm.multilayer* (Chen, 2023) package available for *R* (R Core Team, 2023).

2.4 Results

2.4.1 QAP

Table 5a and 5b shows that positive and negative sender-receiver gossip networks were correlated positively with the nominations as cooperation partners. However, there were differences in values and significance. For instance, positive sender-receiver gossip correlation with cooperation partners in Unit A (0.046) was not statistically significant. Whereas in Unit D, the same relationship (0.150) was statistically significant at 95%. Negative sender-receiver gossip correlations with cooperation partners were statistically significant in both units (A = 0114; D = 0.232), at 95% and 99% respectively. The values on the diagonal (in italics) indicate the number of ties in each network. Above the diagonal, the number of ties that co-occurred between networks is shown.

Table 5a. QAP correlations (low-diagonal) and number of entrained ties (upper-diagonal) for positive sender-receiver gossip, negative sender-receiver gossip and cooperation networks (Unit A). Diagonal indicates the number of ties in each network

	Positive S-R gossip	Negative S-R gossip	Cooperation
Positive S-R gossip	40	28	25
Negative S-R gossip	0.526 ***	61	43
Cooperation	0.046	0.114 **	300

* p <0.10; ** p <0.05; *** p <0.01

Table 5b. QAP correlations (low-diagonal) and number of entrained ties (upper-diagonal) for positive sender-receiver gossip, negative sender-receiver gossip and cooperation networks (Unit D). Diagonal indicates the number of ties in each network

	Positive S-R gossip	Negative S-R gossip	Cooperation
Positive S-R gossip	30	12	22
Negative S-R gossip	0.406 ***	23	21
Cooperation	0.150 **	0.232 ***	155

* p <0.10; ** p <0.05; *** p <0.01

When evaluating correlations using Quadratic Assignment Procedure (QAP; Krackhardt, 1987), we were able to infer only the association between different pairs of networks at the dyadic level. However, beyond the alignment between our networks, we were interested in testing certain hypotheses that assessed whether both entrainment and exchange occurred after considering the internal logics of each network, as well as the attributes of the actors in the network (Zhao and Rank, 2013). A modeling framework that allowed us to overcome this limitation are Exponential Random Graph Models (Cranmer et al., 2020).

2.4.2 ERGM (single layer)

Table 6 shows estimates and standard errors of the ERGMs for positive and negative gossip, and cooperation partners networks. Goodness of fit of the models are reported in Appendix B.3.

To test hypotheses 1 and 2, we examined the endogenous structural parameters of the ERGMs, in relation to the structural logic (Markosvky et al., 1988; Rank et al., 2010) of the positive and negative sender-receiver gossip networks. Specifically, we focused on the effects of reciprocity, transitivity, and multiple connectivity. All of these were estimated in models 1.1. to 1.4. (see Table 6).

For hypothesis 1, we evaluated the coefficient of reciprocity for positive and negative sender-receiver gossip networks. The estimates showed a positive trend but were not statistically significant in the models. Thus indicating that the number of positive

Table 6. ERGMs for positive and negative sender-receiver gossip networks, by working unit (Model 1.1. – Model 1.4.). Letters A and D represents the working unit

	Estimates (S.E.)			
	Model 1.1. - A	Model 1.2. - A	Model 1.3. - D	Model 1.4. - D
Parameters	Positive gossip	Negative gossip	Positive gossip	Negative gossip
Arc	-4.400 (0.673) ***	-3.885 (0.520) ***	-3.267 (0.467) ***	-3.668 (0.559) ***
Reciprocity	0.549 (0.720)	0.596 (0.511)	0.661 (0.811)	1.082 (0.901)
Transitivity	0.801 (0.276) ***	1.211 (0.202) ***	0.848 (0.293) ***	0.780 (0.344) **
Multiple connectivity	-0.184 (0.129)	-0.272 (0.086) ***	-0.282 (0.168) *	-0.509 (0.213) **
Manager (receiver)	0.479 (0.336)	0.415 (0.224) *	0.224 (0.445)	0.524 (0.544)
Manager (sender)	0.622 (0.315) **	0.415 (0.222) *	0.929 (0.454) **	1.173 (0.582) **
Seniority	0.245 (0.117) **	0.164 (0.080) **	0.044 (0.035)	0.070 (0.043)

* p <0.10; ** p <0.05; *** p <0.01

and negative gossip ties between senders and receivers that were reciprocated was not significantly different from what we would expect by chance, considering other actor-relation effects and other structural within-network effects. These results allowed us to conclude that hypothesis 1 was not verified.

For hypothesis 2, our results consistently showed that the estimated coefficients of transitivity were positive and significant, thus indicating that the number of sub-structures closed in triangles was significantly different from what we would expect by chance, considering other exogenous actor-relation effects and other structural within-network effects. For multiple connectivity, the effects were negative in all estimated models of sender-receiver gossip, but not all of them were significant. However, the presence of multiple 2-paths in most sender-receiver gossip networks was less likely than would be expected by chance, beyond the effect of all other processes specified in these models (1.2. to 1.4.). Taken together, the estimates of both parameters allow us to conclude that in negative sender-receiver gossip networks, 2-paths tend to be closed, and therefore, there is a tendency toward closure in these networks. These results partially confirm our hypothesis 2.

2.4.3 ERGM (multilayer)

We evaluated our third and fourth hypotheses using multilayer ERGM models, as we were particularly interested in the entrainment effect (hypothesis 3), and in the exchange effect (hypothesis 4) between both sender-receiver gossip networks and the cooperation partners networks. This also allowed us to check the robustness of the estimates for our first two hypotheses while considering the effects between the networks during estimation.

To verify our hypothesis 3, we evaluated the entrainment effect of positive and negative sender receiver gossip networks on cooperation partners, estimated in models 2.1. to 2.4. (see Table 7). Model 2.4. shows that i was more likely to send negative gossip to j if the former also nominated the latter as a cooperation partner, considering all other effects specified in these models. This suggests that sender-receiver gossip and cooperation multiplexity depends on the valence of the conversation. In this sense, only the results from Model 2.4. indicate the likelihood of i sending negative gossip to j, if the latter was nominated by i as cooperation partner, was higher than expected by chance, beyond the effect of all other processes specified in this model. These results partially supported our hypothesis 3 only for negative sender-receiver gossip and cooperation, since this condition was not met in all units.

Table 7. Multilayer ERGMs for positive and negative sender-receiver gossip and cooperation partners networks by working unit (Model 2.1. – Model 2.4.). Letters A and D represents the working unit

	Estimates (S.E.)			
	Model 2.1. - A	Model 2.2. - A	Model 2.3. - D	Model 2.4. - D
Parameters	Positive gossip	Negative gossip	Positive gossip	Negative gossip
Arc	-4.381 (0.665) ***	-3.927 (0.520) ***	-3.492 (0.506) ***	-4.803 (0.796) ***
Reciprocity	0.529 (0.705)	0.583 (0.495)	0.659 (0.823)	1.109 (0.915)
Transitivity	0.782 (0.264) ***	1.209 (0.202) ***	0.853 (0.287) ***	0.809 (0.348) **
Multiple connectivity	-0.178 (0.124)	-0.273 (0.082) ***	-0.287 (0.165) *	-0.518 (0.218) **
Manager (receiver)	0.467 (0.333)	0.425 (0.215) **	0.169 (0.453)	0.375 (0.508)
Manager (sender)	0.619 (0.314) **	0.519 (0.231) **	0.881 (0.448) **	1.104 (0.558) **
Seniority	0.239 (0.119) **	0.112 (0.087)	0.037 (0.036)	0.048 (0.042)
	Cooperation part.	Cooperation part.	Cooperation part.	Cooperation part.
Arc	-8.025 (2.860) ***	-7.937 (2.999) ***	-5.868 (1.583) ***	-5.772 (1.458) ***
Reciprocity	0.765 (0.283) ***	0.778 (0.279) ***	1.049 (0.372) ***	1.066 (0.370) ***
Transitivity	2.856 (1.700) *	2.845 (1.788)	2.473 (0.904) ***	2.414 (0.839) ***
Manager (receiver)	0.289 (0.244)	0.241 (0.251)	0.603 (0.294) **	0.586 (0.297) **
Manager (sender)	-0.991 (0.240) ***	-1.048 (0.249) ***	0.041 (0.302)	-0.044 (0.302)
Seniority	0.518 (0.084) ***	0.501 (0.083) ***	0.035 (0.021) *	0.035 (0.021) *
	Cross-layer	Cross-layer	Cross-layer	Cross-layer
Entrainment	0.039 (0.382)	0.532 (0.330)	0.594 (0.457)	2.009 (0.753) ***

* p <0.10; ** p <0.05; *** p <0.01

For hypothesis 4, we examined the exchange effect of positive and negative sender-receiver gossip with cooperation partners, estimated in models 3.1. to 3.4. (see Table 8). Models 3.2. to 3.4. show that i was more likely to send positive and negative gossip to j if the latter also nominated the former as cooperation partner, considering all other effects specified in these models. This means that the likelihood of i sending gossip to j, if the latter nominated i as cooperation partner, was higher than expected by chance, beyond the effect of all other processes specified in these models. The results can also be interpreted in the reverse direction. Indeed, our models also show that i was more likely to nominate j as a cooperation partner if the latter also shared positive or negative gossip with the former, considering all the effects specified in

these models. The results partially verified our fourth hypothesis for positive sender-receiver gossip, given that the results were not robust across units. The estimates support our hypothesis 4 for negative sender-receiver gossip and cooperation partners tie exchange.

Table 8. Multilayer ERGMs for positive and negative sender-receiver gossip and cooperation partners networks by working unit (Model 3.1. – Model 3.4.). Letters A and D represents the working unit

	Estimates (S.E.)			
	Model 3.1. - A	Model 3.2. - A	Model 3.3. - D	Model 3.4. - D
Parameters	Positive gossip	Negative gossip	Positive gossip	Negative gossip
Arc	-4.403 (0.652) ***	-3.955 (0.512) ***	-4.683 (0.791) ***	-4.769 (0.840) ***
Reciprocity	0.539 (0.689)	0.586 (0.513)	0.619 (0.790)	1.050 (0.892)
Transitivity	0.791 (0.265) ***	1.208 (0.201) ***	0.859 (0.283) ***	0.825 (0.358) **
Multiple connectivity	-0.179 (0.126)	-0.276 (0.084) ***	-0.296 (0.163) *	-0.518 (0.215) **
Manager (receiver)	0.519 (0.340)	0.582 (0.235) **	0.114 (0.447)	0.474 (0.511)
Manager (sender)	0.609 (0.314) *	0.442 (0.225) **	0.690 (0.441)	1.013 (0.571) *
Seniority	0.198 (0.118) *	0.076 (0.085)	0.027 (0.034)	0.050 (0.043)
	Cooperation part.	Cooperation part.	Cooperation part.	Cooperation part.
Arc	-8.084 (2.999) ***	-7.904 (2.972) ***	-5.953 (1.568) ***	-5.973 (1.598) ***
Reciprocity	0.768 (0.286) ***	0.762 (0.275) ***	1.040 (0.368) ***	1.051 (0.370) ***
Transitivity	2.917 (1.800)	2.836 (1.770)	2.503 (0.897) ***	2.538 (0.911) ***
Manager (receiver)	0.271 (0.251)	0.203 (0.246)	0.437 (0.304)	0.498 (0.301) *
Manager (sender)	-1.000 (0.243) ***	-1.092 (0.245) ***	0.070 (0.306)	0.064 (0.319)
Seniority	0.507 (0.084) ***	0.498 (0.083) ***	0.034 (0.021)	0.031 (0.021)
	Cross-layer	Cross-layer	Cross-layer	Cross-layer
Exchange	0.437 (0.381)	0.868 (0.344) **	2.382 (0.749) ***	1.928 (0.790) **

* p <0.10; ** p <0.05; *** p <0.01

Table 9. Multilayer ERGMs for positive and negative sender-receiver gossip and cooperation partners networks by working unit (Model 4.1. – Model 4.4.). Letters A and D represents the working unit

	Estimates (S.E.)			
	Model 4.1. - A	Model 4.2. - A	Model 4.3. - D	Model 4.4. - D
Parameters	Positive gossip	Negative gossip	Positive gossip	Negative gossip
Arc	-4.383 (0.673) ***	-3.951 (0.528) ***	-4.681 (0.812) ***	-5.419 (0.984) ***
Reciprocity	0.554 (0.714)	0.528 (0.521)	0.615 (0.834)	0.676 (0.905)
Transitivity	0.791 (0.276) ***	1.207 (0.200) ***	0.856 (0.283) **	0.836 (0.352) **
Multiple connectivity	-0.184 (0.131)	-0.274 (0.086) ***	-0.305 (0.162) *	-0.509 (0.209) **
Manager (receiver)	0.567 (0.349)	0.562 (0.240) **	0.132 (0.452)	0.384 (0.505)
Manager (sender)	0.598 (0.329) *	0.470 (0.228) **	0.690 (0.443)	0.949 (0.561) *
Seniority	0.201 (0.127)	0.061 (0.091)	0.027 (0.034)	0.040 (0.043)
	Cooperation part.	Cooperation part.	Cooperation part.	Cooperation part.
Arc	-7.949 (2.894) ***	-7.875 (2.953) ***	-5.817 (1.492) ***	-5.836 (1.549) ***
Reciprocity	0.761 (0.280) ***	0.736 (0.283) ***	1.033 (0.394) ***	0.895 (0.378) **
Transitivity	2.831 (1.721)	2.829 (1.759)	2.429 (0.860) ***	2.489 (0.887) ***
Manager (receiver)	0.268 (0.246)	0.184 (0.249)	0.447 (0.308)	0.518 (0.303) *
Manager (sender)	-1.002 (0.245) ***	-1.104 (0.250) ***	0.070 (0.312)	-0.012 (0.304)
Seniority	0.511 (0.083) ***	0.495 (0.082) ***	0.034 (0.022)	0.032 (0.022)
	Cross-layer	Cross-layer	Cross-layer	Cross-layer
Entrainment	-0.062 (0.398)	0.257 (0.362)	0.006 (0.513)	1.623 (0.808) **
Exchange	0.446 (0.407)	0.773 (0.368) **	2.393 (0.780) ***	1.473 (0.796) *

* p <0.10; ** p <0.05; *** p <0.01

Finally, we estimated models with all the endogenous structural parameters, actor-related effects, and the two cross-layer effects of the networks in models 4.1. to 4.4. (see Table 9). Following the endogenous structural parameters of the positive and negative sender-receiver gossip networks that allowed us to verify the first two hypotheses, the estimates were identical in their direction and statistical significance. Furthermore, the cross-layer effects between networks were robust to the inclusion of all parameters in the models. Specifically, this means that these results remained partially supportive of our hypothesis 3, only for negative sender-receiver gossip; and partially supportive of our hypothesis 4 for positive sender-receiver gossip and cooperation partners tie exchange. The estimates supported our hypothesis 4 for negative sender-receiver gossip and cooperation partners tie exchange.

2.5 Discussion and conclusions

The emergence and maintenance of cooperation are pivotal in organizational environments where groups face complex challenges to achieve shared goals. Informal conversations in these contexts allow workers to gain valuable information to better understand their environment and develop instrumental and affective relationships with colleagues (Grosser et al., 2010; Ellwardt et al., 2012a). Gossip facilitates the reputational flow within these groups with different impacts on the various parties involved. This suggests that cooperation may evolve as individuals decide whether to expand their relationship with third parties and whether they wish to cooperate among themselves, if they share expectations concerning norms. In addition to direct experiences derived from the obligations imposed by the organizational structure, workers gain knowledge through gossip that enables them to make informed decisions about with whom they wish to cooperate, thereby fostering and sustaining cooperation in the long run along the informal social structures of communication that permeate working environments.

Our study shows a network association between gossip and nominations as cooperative partners within organizations, thus revealing potential mutual reinforcement and exchange of interpersonal trust relationships (Grosser et al., 2010; Ellwardt et al., 2012a). However, our results reveal differences between types of evaluative gossip conversations between senders and receivers. Often overlooked in the literature (e.g., Dores Cruz et al., 2021a), this difference seems fundamental for describing the relationship between gossip and other instrumental ties, such as the selection of cooperation partners. For instance, our hypothesis that “individuals are more likely to gossip positively and negatively with others they also nominate as cooperation

partners, than expected by chance" was supported only for negative gossip in one organization. This result deserves attention if we follow the idea that successful cooperation may develop trust as a result. If this holds true, then the trust developed in these cooperative interactions may not be sufficient for senders to share negative gossip with those with whom they should formally cooperate and "would also like to cooperate". A second interpretation of this finding is that gossip senders may build up their trust to share information in other relationships, such as affection.

We found a similar pattern for the exchange hypothesis (i.e., positive and negative gossip between senders-receivers is more likely to be exchanged with a nomination as a cooperation partner, than expected by chance). Specifically, our results supported this hypothesis for negative gossip between senders and receivers, but for positive gossip within the same dyad only in one organization. This latter finding is of particular interest for conceptualizing gossip as social exchange. In our baseline hypothesis for the social exchange of positive and negative gossip between senders and receivers, we found a positive effect of reciprocity in both organizations. However, neither was statistically significant when we controlled for all the parameters included in our models (cf., Ellwardt et al., 2012a, 2012b). That is, although senders and receivers of positive and negative gossip seemed to follow the reciprocity principle of "repayment in kind" (Cropanzano and Mitchell, 2005; Martinescu et al., 2019), they were more likely to exchange for other "currencies" or social goods. In this case, for those who shared negative gossip, with a nomination as a cooperation partner. This result should also be considered with caution, as the nature of our data did not allow us to disentangle which good preceded the other, i.e., whether senders exchanged negative gossip after they already had a cooperative relationship with the receiver, or the other way around.

Certain differences in the consequences of various types of gossip, particularly for the reputation of the sender, have been found in previous research (e.g., Kurland and Pelled, 2000). This suggests that gossip entails risks and costs for the reputation of all parties involved (Giardini and Wittek, 2019a). For instance, it has been shown that senders of negative gossip are more likely to be disliked by others (Farley, 2011). The reputational risks associated with negative gossip imply that its senders require more interpersonal trust from their potential receivers (Burt and Knez, 1995; Burt, 2005). It has been shown that senders of prefer to share negative gossip with individuals with whom they have a strong emotional relationship, such as friendship, as this allows them to reduce the risk of information leakage and avoid negative consequences (Ellwardt et al., 2012b). Conversely, senders share positive gossip more freely, regardless of the nature of their relationship with the receiver (Grosser et al., 2010).

In this sense, our findings underscore that gossip can be effective in situations that require higher levels of interpersonal trust, either by strengthening relationships directly or through exchange. This suggests that gossiping does not necessarily harm the sender's reputation, contrary to signaling theory's predictions (Giardini and Wittek, 2019a). Instead, in organizational contexts, sending gossip may signal trust from the sender towards the receiver, or highlight the sender's possession of valuable information, rendering them an appealing cooperation partner (McAndrew and Milenkovic, 2002).

Our results also provide evidence for the structural effects, or network configurations, that may identify positive and negative gossip between senders and receivers. Specifically, we found that negative gossip between senders and receivers was more likely to take place in dense, close-knit structures. This hypothesis was also partially confirmed for positive gossip within one organization. This finding is even more informative when complemented by the descriptive information about these networks in which triadic cycles were absent. We found positive transitivity and negative multiple connectivity effects. In simple terms, that senders were more likely to share (negative and positive) gossip with a receiver-of-receiver.

Our contribution highlights the importance of the definitions and methodological approaches used in gossip studies. In our analysis, we distinguished between different valences or evaluative content, although we did not test any specific hypotheses about these different types of conversations between senders and receivers. This distinction has been overlooked in most gossip research, and it has even been suggested that it should not be considered as a defining aspect of gossip (Dores Cruz et al., 2021a). However, our findings here indicate certain differences in the mechanisms studied depending on the type of conversation. Therefore, interpretations about the reputational consequences of the parties involved in gossip largely depend on the definition and measurements used. Empirical research has shown that different types of gossip might have different consequences for individual reputations (Kurland and Pelled, 2000; Sommerfeld et al., 2007). Instead of focusing on the potential consequences as we have done here, an aspect that would deserve explorations is investigating the structural interdependencies that would either lead or refrain an individual to gossip with one another (Wittek et al., 2000; Giardini and Wittek, 2019b).

In short, our contribution has certain methodological and practical strengths. First, data collection was conducted as part of a project specifically designed to investigate the role of gossip in reputation and cooperation. The team conducted a comprehensive analysis of the organizational settings, collecting both qualitative and quantitative data at the individual and relational level, which helped us to test

conditional hypotheses about the role of gossip. Prior knowledge developed in research associated with this project (Pápay, 2021; Estévez et al., 2022a; Estévez and Takács, 2022) facilitated our understanding of the empirical setting and the nature and type of data. Second, to the best of our knowledge, with the noticeable exception of Wittek et al. (2000), our study is one of the few directly investigating the relationship between gossip and cooperation in an organizational setting.

This said, our study has also certain limitations. First, the cross-sectional nature of our data did not permit any causal explanation regarding the dynamics between positive and negative gossip between senders and receivers and cooperation partner networks. We know that longitudinal sociometric data collection has problems and challenges, but developing network studies that measure these temporal dynamics is important (Ellwardt, 2019). Secondly, although we relied on several theories to explain the relationship between the core concepts and formulate our research hypotheses, the lack of a unified conceptual framework in gossip studies complicates the design of empirical measurements and undermines findings cumulativeness and generalization (Dores Cruz et al., 2021a; Giardini and Wittek, 2019a). Here, recent work by Wittek and Giardini (2023) who proposed a theoretical integration based on goal framing theory for gossip research, is a step-forward. Furthermore, while social network analysis can offer a detailed examination of interdependencies, the use of agent-based models could enhance our understanding of how these networks emerge and evolve in populations of varying sizes, with agents prioritizing different goals that shape their behavior (Renzini et al., 2024).

Undoubtedly, further research is still needed to capture the nuanced relationships between gossip and cooperation in organizational environments. Here, we believe that two empirical settings would be of paramount interest. First, we should investigate inter-organizational contexts where groups rely on each other to perform tasks and achieve goals. This would allow us to analyze both the internal dynamics of each organization and the transmission of information between organizations' members, which affect their dispositions towards cooperation. In this context, certain constraints on cooperation imposed by the organizational structure could be less stringent than those present in our study. Second, we should study gossip and cooperation in contexts where workers are independent but share a common workspace (e.g., see the case of co-working space in Bianchi et al., 2018). In these settings, no structural constraints exist for cooperation, so predispositions towards cooperation could genuinely reflect the development of gossip-induced affective and instrumental ties. Studies in these contexts could significantly enhance our understanding of the structural dynamics of gossip and cooperation in situations of competition and collaborative work.

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Chapter 3

Neutral gossip and affective relationships in the workplace[i]

Abstract: Gossip has the function of influencing, informing, and bonding individuals. While this holds for positive and negative information, the role of neutral gossip is still unclear. From a social exchange perspective, this article investigates the relationship between neutral gossip with affective relationships in a public administration organization in Budapest, Hungary, using a multiplex network model. Using individual-level information and sociometric data on social and affective relationships among employees, we estimated single and multilayer Exponential Random Graph Models (ERGMs) to test whether neutral gossip fulfills any social bonding function by reinforcing and exchanging information for affective relationships. Our results show that neutral gossip can help individuals strengthen their affective ties, and that information can be reciprocated with affective ties by its receivers. This suggests that neutral gossip may serve a social bonding function through the development of affective relationships without having to incur reputational risks like other forms of evaluative conversations (e.g., negative gossip).

Keywords: Gossip; Affective relationships; Networks; Social Exchange Theory; Organizations; Multilayer ERGMs.

[i]This chapter was written in co-authorship with Federico Bianchi (University of Milan). A previous version of this chapter was presented in: VIII Convegno Società Italiana di Sociologia Economica (SISEC), in Cagliari, Italy (February 1, 2024).

3.1 Introduction

Gossip is a type of informal conversation between two individuals exchanging information about an absent third party (Foster, 2004; Michelson et al., 2010). It has been considered a fundamental process in all human societies (Emler, 1994; Dunbar et al., 1997; Giardini and Wittek, 2019a). Gossip, which is highly popular in its practice, has transcended time and cultures (Gluckman, 1963; Cox, 1970; Brenneis, 1984; Besnier, 1989; Wilson et al., 2000). Research has shown that gossip is highly functional for group contexts, such as organizations (Fine and Rosnow, 1978; Wittek and Wielers, 1998; Kurland and Pelled, 2000; Foster, 2004; Mills, 2010; Beersma and Van Kleef, 2012; Besnier, 2019). In the workplace, gossip is a common practice among almost all individuals (Grosser et al., 2012; Robbins and Karan, 2020).

In this study, we use a definition of gossip that is particularly suited to these contexts, as "informal and evaluative talk in an organization, usually among no more than a few individuals, about another member of that organization who is not present" (Kurland and Pelled, 2000: 429). The prevalence of gossip in the workplace highlights the importance of understanding its processes to comprehend social dynamics in organizations (Noon and Delbridge, 1993; Beersma et al., 2019; Fan and Grey, 2021; Dores Cruz et al., 2021): people discuss their supervisors' behavior, relationships among colleagues, and others' performance in everyday tasks.

Social exchange theory (SET; Blau, 1964; Homans, 1958, 1961; Emerson, 1976; Cropanzano and Mitchell, 2005) offers a solid conceptual framework for analyzing the functionality of gossip, widely employed in literature (e.g., Rosnow, 1977, 2001; Kim et al., 2019; Martinescu et al., 2019a; Bilinović Rajačić et al., 2020; Martinescu et al., 2021; Wax et al., 2022). The main argument is that gossip is functional in the reciprocal exchange of valuable social resources for individuals (Fine and Rosnow, 1978; Foster, 2004; Beersma and Van Kleef, 2012), i.e., the value of gossip is derived from the many functions it can serve (Rosnow, 2001). Following SET, a series of successful information exchanges would allow individuals to develop affective relationships characterized by commitment and trust (e.g., Blau, 1964; Cropanzano et al., 2017). In this approach, gossip has been defined as small talk with a social purpose, in which its participants share information about others in exchange for something in return (Rosnow and Fine, 1976). There is consensus in the literature regarding three social resources exchanged through gossip: influence, information, and intimacy (Rosnow, 1977, 2001; Beersma et al., 2019; Martinescu et al., 2019a). Social exchange theory framework is particularly useful for investigating how gossip affects the relationship between the sender and receiver (Greenslade-Yeats et al., 2023).

However, this evidence stems from studies that have focused on observing negative and positive gossip, overlooking neutral gossip in the development of these exchanges. In analyses, definitions of the valence or tone of the conversation are generally "peer-rated", i.e. reported by their receivers. This means that they do not always reflect the real intentions of the senders, and even more can be misinterpreted (e.g., Testori et al., 2023). The example provided by Dores Cruz et al. (2019: 263) serves both to illustrate valences and the way in which information about another colleague, who is not present in the conversation, can be interpreted: "*a sender can share information that they consider neutral such as telling a colleague that another colleague is on holiday. Yet, the receiver can interpret this as either positive (i.e., "the target is taking good care of themselves, more people should do that"), or negative (i.e., "the target is neglecting responsibilities")*".

This gap in the literature is important to address because it has been shown that the prevalence of neutral gossip is as significant as that of conversations with positive and negative content (Dores Cruz et al., 2021). There is also evidence suggesting that neutral conversations would be the main form of communication about third parties (e.g., Levin and Arluke, 1985; Dunbar et al., 1997; Robbins and Karan, 2020). Neutral gossip has been characterized by serving an informative function, either to obtain new information or to validate previous communication (McDonald et al., 2007; Dores Cruz et al., 2021), and by its ability to positively influence receivers' perceptions of targets (Baum et al., 2020). A pending topic in the organizational gossip literature is whether neutral conversations fulfill an intimacy function by allowing individuals to develop affective relationships. For instance, the association between neutral gossip and intimacy has been shown to be negative in adolescents (McDonald et al., 2007; cf. Wargo Aikins et al., 2017).

Understanding the role of neutral gossip in the development of affective relationships is relevant not only due to its prevalence in everyday conversations. For sociological research, it is particularly important to understand and explain its primary function of bonding individuals (Gluckman, 1963; Dunbar, 1996, 2004; Bosson et al., 2006). In general terms, it has been emphasized that gossip serves to satisfy the basic need for affiliation and emotional support (Baumeister and Leary, 1995). In the organizational context, gossip also serves this primary function (Rosnow, 2001; Grosser et al., 2012), promoting group cohesion (Soeters and van Iterson, 2002), interpersonal trust (Burt and Knez, 1995; Burt, 2001, 2005), friendship (Ellwardt et al., 2012a), and a shared morality (McAndrew, 2019). These interpersonal relationships are consolidated in informal groups, and gossip can impact them both positively (e.g., Kuo et al., 2018) and negatively (e.g., Farley et al., 2010; Farley, 2011). Gossip

provides signals of belonging to these cohesive groups. Here, Gluckman (1963: 313) referred to gossip exchange as "*a privilege which is only extended to a person when he or she is accepted as a member of a group or set. It is a hallmark of membership. Hence rights to gossip serve to mark off a particular group from other groups*".

Therefore, participation in these activities directly influences the establishment and modification of informal group boundaries. Our main hypothesis is that neutral gossip would facilitate the development of affective relationships between its senders and receivers. This means that risks to the sender's reputation (Rosnow, 2001; Wu et al., 2021) would be significantly reduced or possibly non-existent in neutral gossip scenarios. In contrast, for instance, it has been shown that negative gossip is costly for their senders (Giardini and Conte, 2012; Dores Cruz et al., 2021), i.e. that sharing negative evaluations can damage the sender's reputation (Kurland and Pelled, 2000; Farley, 2011).

This work aims to contribute to the literature by empirically studying the effect of neutral gossip on the development of affective relationships within a group of workers in an organization belonging to the public administration sector. We analyzed the multiplex network of neutral gossip and affective relationships among them. We focused on the dyads representing neutral gossip senders and receivers. For affective relationships, we constructed a composite network using a method for clustering of multiplex networks (Vörös and Snijders, 2017) from multiple affective relationships among the workers. Specifically, we considered friendship, trustworthiness, listening to others, frequent personal conversations, and appreciation. We analyzed these networks using Exponential Random Graph Models (ERGMs) (Lazega and Pattison, 1999; Lusher et al., 2013). This allowed us to test hypotheses involving endogenous effects in both networks, exogenous effects of the relationship between actors in the gossip network, and hypotheses implying effects between the networks of neutral sender-receiver gossip and affective relationships.

The remainder of the paper is organized as follows. Section 2 presents the background of our research and the hypotheses to be tested. Section 3 describes the data and methods used for the analyses. Section 4 presents the results and contrasts them with the hypotheses. Section 5 discusses the main findings, comments on limitations, and proposes future research agenda avenues.

3.2 Research background and hypotheses

3.2.1 Social exchange theory applied to gossip

According to social exchange theory (Cropanzano and Mitchell, 2005), relationships between two actors involve the exchange of valuable resources, with reciprocity or repayment as the main norm. This theory suggests that through reciprocal exchange, individuals build social relationships based on trust and commitment (Blau, 1964; Homans, 1958, 1961; Emerson, 1976). The willingness to engage in social exchange depends on whether the benefits outweigh the costs for all involved (Molm et al., 1999). Although there are different forms of social exchange, three common features can be identified. First, there is the initial behavior of one party toward the other. Second, there is the subsequent reciprocity from the other party, which includes both attitudes and actions. Third, there is the establishment of a relationship between them. When a series of successful reciprocations occur, individuals can develop a "high-quality social exchange relationship," meaning they become affectively committed and more trusting (Cropanzano et al., 2017).

The conceptualization of gossip as a form of social exchange (Rosnow, 1977, 2001) is based on a comparison with three patterns of trading practices (Polanyi et al., 1957). These patterns allowed the identification and contrast of three primary social functions of gossip (i.e., information, influence, and intimacy), which were used to explain how evaluative information exchange can operate in a similar way. Gossip primary functions are not mutually exclusive, and it is possible to overlap some of them in certain situations. In this approach, the main argument is that gossip is an instrumental transaction in which an actor A and B trade information about an actor C for something in return –more gossip, status, fun, money, social control, or any material or psychological stimulus capable of fulfilling preconditioned needs, wishes, and expectations (Rosnow, 1977: 158). In sum, these functions can (un)indirectly lead individuals to become affectively committed. According to social exchange theory, one might expect gossip to tend toward reciprocity between its senders and receivers.

Hypothesis 1. Neutral gossip ties are more likely to be reciprocated, than expected by chance.

Information

The informational function of gossip has been contrasted with a redistributive trading pattern, which is mainly characterized by fairness. In this sense, gossip is informative

when it can be efficiently used by individuals as a means of social comparison, allowing them to gain a better understanding of their environment (Hannerz, 1967; Suls, 1977; Foster, 2004; Wert and Salovey, 2004). This function is particularly useful when formal channels of communication have become overburdened (Rosnow, 1977). Neutral gossip has been especially recognized for its informational function. It is possible to identify two scenarios in organizations where neutral gossip can play this function. On the one hand, when individuals try to integrate into an organization or group, one of their first needs is to feel socially accepted and included (Baumeister et al., 2004; Bauer et al., 2007; Martinescu et al., 2021). Gossip, which is a common practice in these environments (Bai et al., 2020), provides opportunities for socialization to achieve group inclusion (Ribarsky and Hammonds, 2019). Neutral communications, as they do not entail high reputational costs for their senders, can be crucial for new members to socially integrate into an organization (Giardini and Conte, 2012; Dores Cruz et al., 2021). Since gossip conveys signals about an individual's social skills and competencies (McDonald et al., 2007; Carlo et al., 2005), communicating it neutrally can be a valuable skill for establishing positive relationships by demonstrating that the sender understands the environment and is committed to not speaking ill of the receiver in future interactions with third parties. Based on this evidence, we seek to evaluate a first hypothesis at the individual level about who initiates neutral gossip, in terms of the experience working in the organization.

Hypothesis 2. Workers who have joined the organization more recently are more likely to send neutral gossip ties, than expected by chance.

On the other hand, according to this perspective, gossip which serves a purely normative orientation is also considered informational (Rosnow, 1977), e.g., when individuals share information to establish and maintain group norms and values related to work (Begemann et al., 2021). This could be especially relevant for organizational leaders, who might be inclined to use neutral gossip as an informal means of communication to convey these signals to their peers and supervisees. Just as for workers recently joining an organization, a manager who communicates neutrally when talking about other workers in their absence demonstrates an understanding of the environment and a commitment not to make negative judgments about the receiver in future interactions with third parties. Based on these approaches, we seek to test a second hypothesis at the individual level about who initiates gossip, in terms of the formal position in the organizational structure.

Hypothesis 3. Managers are more likely to send neutral gossip ties, than expected by chance.

Intimacy

The intimacy function of gossip refers to when the exchange is primarily done for entertainment and amusement rather than to convince someone of a moral position or to seek news. This function has been paralleled with a reciprocal exchange pattern of trade that is characterized for equity and parity. In these gossip exchanges, as there are mutual benefits for the interacting parties, there is a tendency toward symmetry in the transaction of small talk (Rosnow, 1977). Different situations represent when gossip its used for socializing and establishing and maintaining emotional relationships (e.g., Barkow, 1992; Emler, 1994; Dunbar, 1996, 2004; Wilson et al., 2000; McAndrew and Milenkovic, 2002; Bosson et al., 2006). The intimacy function satisfies the essential need for individuals to connect emotionally with others and receive support (Baumeister and Leary, 1995), which allows for the expression of emotions and a sense of belonging to a group (Coleman, 1988, 1990). In this sense, the exchange of small talk is a way of signaling to both parties that they have similar interests or belong to the same social group, but also that they share a certain level of trust (Rosnow, 2001).

Gossip is a selective practice, shared with those whom the sender believes will understand and support their perspective due to similar past experiences, threats, or opportunities (Martinescu et al., 2019b). Exchanging similar experiences generates a sense of bonding. On the one hand, from a group level perspective, the "hallmark of membership" (Gluckman, 1963) associated to gossip means that it allows individuals to become socially closer while discussing topics or events relevant to its members (Michelson and Mouly, 2004). These information exchanges establish boundaries between those who belong to the group and those who are outside of it (Eckert, 1990; Noon and Delbridge, 1993; Dunbar, 2004). In sum, what begins as a trusted exchange in private becomes at the group level the boundaries of knowledge and norms (Foster, 2004). On the other hand, at the dyadic level, it has been empirically shown that gradual exchanges of information about third parties help cement and consolidate friendship relationships between senders and receivers (Ellwardt et al., 2012a). This aligns with theoretical perspectives suggesting that gossip can strengthen relationships that inherently provide emotional rewards for those involved (e.g., Rosnow and Fine, 1976; Gambetta, 1994; van de Bunt et al., 2005). For instance, it has been mentioned that, by using gossip, individuals may build trust, mutual sympathy, interpersonal closeness, solidarity, and a shared social identity (Fine and Rosnow, 1978; Wert and Salovey, 2004; Bosson et al., 2006; Martinescu et al., 2019a, 2019b).

This literature suggests that gossip is linked to different types of affective relationships, an association also observed in organizational settings. For instance, empirical research has shown the association of gossip with trust (Burt and Knez, 1995; Burt, 2001, 2005), and friendship (Ellwardt et al., 2012a; Grosser et al., 2010). This underscores that multiplexity characterizes gossip relationships in the workplace. Given that social exchange theory predicts that gossip functions can lead to interpersonal relationships based on commitment and trust (Rosnow, 2001), here we wanted to test two hypotheses. It is expected that individuals seek to gossip at work to establish affective relationships and receive social support. Therefore, it is expected that individuals would be inclined to gossip neutrally with coworkers with whom they have a relationship perceived as affective, using these conversations to strengthen them (Hypothesis 4); as well as that receivers would reciprocate neutral gossip by perceiving the relationship as an affective one (Hypothesis 5).

Hypothesis 4. Neutral gossip is more likely to be initiated with those with whom one has an affective relationship, than expected by chance.

Hypothesis 5. Neutral gossip is more likely to be reciprocated with an affective relationship, than expected by chance.

3.3 Research design and methods

To test our hypotheses, we used data from a full-network study on a population of 24 employees of an organization in the public administration sector based in Budapest, Hungary. The data comprises a set of relational and individual dimensions on the entire population collected in the field on 2016 and 2018[1].

3.3.1 The empirical setting

At the time of the fieldwork, the organization had been in operation for four years. The organizational structure was clearly defined, with small internal teams working together on specific tasks. Staff responsibilities included writing project proposals and managing finances for other institutions in the sector. These tasks were constantly

[1]The Hungarian Academy of Sciences - Centre for Social Sciences 'Lendület' Research Center for Educational and Network Studies (RECENS) carried out the EVILTONGUE project, led by Károly Takács. The data was collected as part of this project by Boróka Pápay and Eliza Bodor-Eranus. The project received funding from the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation programme (grant agreement N. ERC/648693).

changing, so the organization was restructured accordingly. Six workers were coordinating and directing these tasks. The researchers obtained access to the organization through direct negotiations with management, who facilitated contact with employees for the survey application. Managers were then interviewed to obtain qualitative information about the work environment.

3.3.2 Qualitative fieldwork

After collecting data on formal and informal relationships within the company, a qualitative study of the work environment was conducted to gain detailed insights into internal policies, employee practices, organizational dynamics, and available resources[2]. This approach provided a comprehensive understanding of the organizational culture. Semi-structured interviews were conducted with HR professionals and managers to gain in-depth knowledge of the organization's employees. They also provided details on hiring processes, performance evaluation methods, years of experience within the organization, salary levels, and positions held by employees.

Two-thirds of the team in this organization were women. Out of the six managers, four were also women. Most of these individuals had professional backgrounds in administration and social work. The work they performed was characterized by high dynamism, leading to considerable pressure and stress on the workers. This resulted in high turnover, either due to dismissals or resignations stemming from job demands. The new members were selected based solely on their performance or experience in similar previous roles.

The organization did not provide recreational spaces or additional events beyond work for its employees. As a result, relationships among workers were cordial but formal, and they rarely spent time together outside of working hours.

3.3.3 Data and variables

Relational and individual level data were obtained through a self-administrated computer based questionnaire. Details of the survey can be found in Chapter 1. The questionnaires and the translation from Hungarian to English are available for the full questionnaire in Appendix A.1, and of the sociometric information used in this study are available in Appendix C.1.

[2]For more information on the information given here, see the work of Pápay (2021).

Individual-level data allow to control for the possible confounding effect of the characteristics of the organization's employees and the relationships they have with each other. Data on socio-demographic characteristics such as age, gender, level of education, and years of experience in the organization were also obtained and are summarized in Table 1. Figure 1 shows the distribution of years of experience in the organization, differentiated by job position.

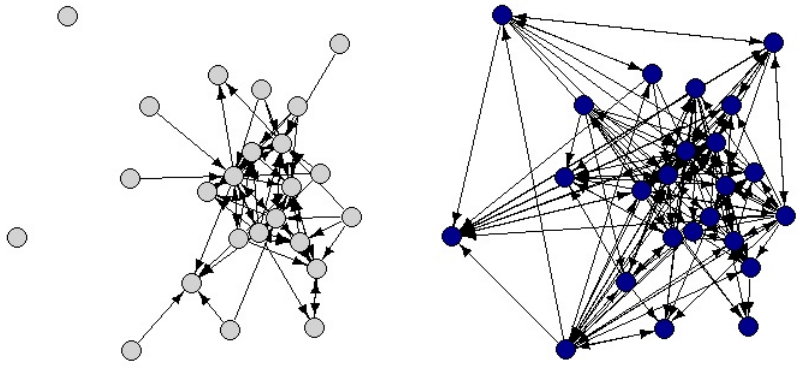
Table 1. Subjects' main characteristics

Number of subjects	24
Gender	Female = 18; Male = 6
Age (years)	Mean = 37.7 (S.D. = 7.6)
Age (range)	[25, 55]
Position	Managers = 6; Regular workers = 18
Number of female managers	4
Seniority (years)	Mean = 2.8 (S.D. = 1.0)
Seniority (range)	[2, 6]

Variables

Data on affective relationships and neutral gossip were collected using the roster method. Respondents were asked to consult an alphabetical list of colleagues and select those with whom they interacted, as indicated in the question. This method was used to identify the individuals with whom the respondents had relationships. The data were organized into 24 by 24 binary adjacency matrices, where each cell X_{ij} represented the relationship between individual i and j. For instance, if i considered j as a friend, the corresponding cell X_{ij} in the friendship matrix was coded as 1; otherwise, it was coded as 0. *Neutral sender-receiver gossip* and the composite network of *affective relationships* are the main variables of our study (see Figure 1).

Figure 1. Neutral sender-receiver gossip and affective relationships networks graphs



(a) Neutral S-R gossip

(b) Affective relationships

Neutral sender-receiver gossip network

Information about neutral gossip relationships was obtained through a three-question procedure (Ellwardt et al., 2012a; Ellwardt et al., 2012b; Ellwardt, 2019). First, respondents were asked to identify those colleagues who had shared personal information about another colleague with them in the past three months. This permitted to identify gossip senders from the perspective of the receiver. Collecting gossip data based on the receiver's perception has the advantage of being more accurate, as self-reported gossip is more prone to social desirability response bias, because it is considered an undesirable behavior (Nevo et al., 1994). Second, they were asked about the identity of the person being discussed, which allowed for the identification of the targets. However, this information was not used in our study because we were interested in studying sender-receiver dyads. Finally, they were asked about the type of information received (positive, neutral, or negative), which made it possible to determine the tone or valence of the conversation. To identify the neutral gossip matrix, we filtered the information from the first question according to the valence (i.e., with information from the third question). Then, for this matrix, we defined cell $X_{ij} = 1$ if individual i had provided neutral personal information about another colleague to j in the past three months, and $X_{ij} = 0$ otherwise.

Affective relationships network

Following the social exchange approach to gossip, we were interested in studying the association between neutral information exchange and employees' affective relationships. Although gossip has been specifically associated with some of these relationships, such as trust and friendship, our interest focused on how gossip might be associated with a more comprehensive measure of affective relationships characterized by commitment and trust in exchange. To do this, we combined responses to five different questions that identified dimensions of friendship, trustworthiness, frequent personal conversations, appreciation, and listening to others. We used an analytical procedure for dimension reduction in multiplex network data (Vörös and Snijders, 2017) to define a composite network of affective relationships. We defined cell $X_{ij} = 1$ if individual i nominated j in at least three of these dimensions; otherwise, $X_{ij} = 0$. For simplicity, we refer to this network as affective relationship. Information about the method can be found in Chapter 1. Descriptive information for each of the network dimensions, and other statistics used to establish our decision using this method are available in Appendix C.2.

Descriptive statistics

Table 2 presents graph-level descriptive statistics of the neutral sender-receiver gossip and affective relationships networks.

Considering some of the statistics relevant to our hypotheses, reciprocity was higher in the affective relationship network than in the neutral sender-receiver gossip network. In the former, there were 33 pairs of reciprocated ties (reciprocity: 43.2%), while in the latter, there were 9 pairs of reciprocated ties (reciprocity: 27.3%). The number of entrained ties, i.e., when i sent neutral gossip and had an affective relationship with j, were 32 (see Figure 2a). The number of exchanged ties, or when i sent neutral gossip to j and the latter reciprocated with an affective relationship to the former, were also 32 (see Figure 2b). This means that in almost half of the neutral gossip ties, the sender also had an affective relationship with the receiver, or they received an affective tie from the receiver in return.

Table 2. Networks descriptive statistics

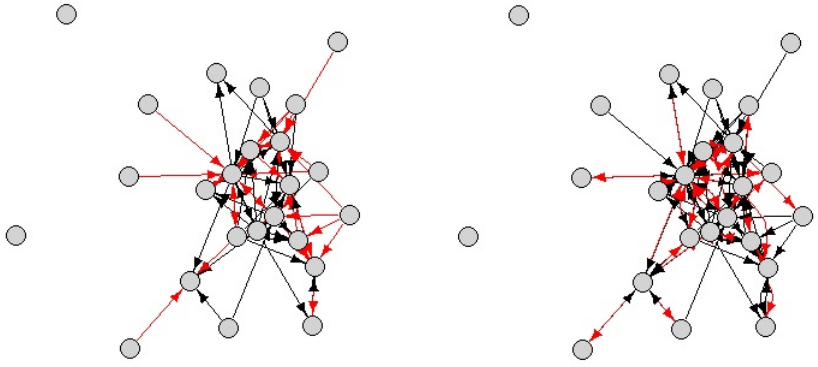
	Neutral S-R Gossip	Affective relationship
Ties	66	152
Density	0.120	0.275
Mean In-/Out-degree	2.750	6.333
Std. dev. In-degree	3.313	3.158
Std. dev. Out-degree	2.707	4.198
In-degree centralization	0.329	0.348
Out-degree centralization	0.329	0.484
Number of reciprocated pairs	9	33
Transitive Triads (030T)	24	59
Entrained ties	32	
Exchanged ties	32	

Figure 3(A) shows the out-degree distribution of neutral gossip by seniority measured in years working for the organization. From this distribution, it can be noticed that the subjects who were above average in seniority were those who sent more neutral gossip ties. Figure 3(B) shows the out-degree distribution of neutral gossip by formal position in the organization. From these distributions, it can be observed that the eighteen regular workers sent 36 neutral gossip ties (55.5%), while the six managers sent 30 ties (45.5%).

3.3.4 Analytical strategy

We estimated single and multilayer Exponential Random Graph Models (ERGMs) of the neutral sender-receiver gossip and affective relationship networks (Lazega and Pattison, 1999; Lusher et al., 2013) to empirically test our hypotheses. Statistical forms and technical specifications for these models can be found in Chapter 1.

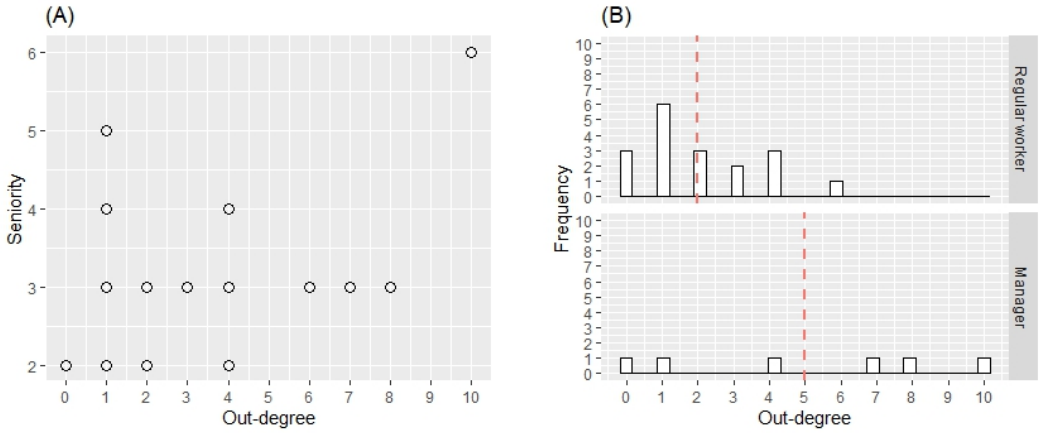
Figure 2. Neutral sender-receiver gossip network graphs (black ties) with (a) entrained and (b) exchanged affective relationship ties (in red)



(a)
Neutral S-R gossip
and entrained affective relationship ties

(b)
Neutral S-R gossip
and exchanged affective relationship ties

Figure 3. Out-degree distribution of neutral gossip by seniority (A) and formal position (B) in the organization. Red colored lines in (B) represent the mean for the respective position.



ERGMs specification

In Model 1 (see Table 3), we estimated the occurrence of the observed neutral sender-receiver gossip network. This served for two purposes. First, it allowed us to analyze the structural logic (Markovsky et al., 1988; Rank et al., 2010) of our network. Second, it enabled us to test three of our hypotheses.

The first hypothesis postulated that neutral gossip ties are more likely to be reciprocated, than expected by chance. We operationalized it with a reciprocity effect. In the second set of hypotheses, we postulated that workers who have joined the organization more recently (hypothesis 2) and managers (hypothesis 3) are more likely

to send neutral gossip ties, than expected by chance. We operationalized both hypotheses with two exogenous effects (actor-relation effects) that capture the tendency to send neutral gossip ties. Since the seniority variable is continuous, we included a single parameter that jointly assess the tendency toward and activity (sending ties) and popularity (receiving ties). The impossibility to separate the effects into two parameters is due to the limitations of the package used for estimation. While job position is a categorical variable, we used one parameter to assess the activity of those in managerial positions in the organization and controlled for a second parameter to measure the popularity of the same individuals. We also incorporated two endogenous structural effects as controls: arc, and path closure. For the latter, we used a network statistic known as geometrically weighted edgewise shared partnerships (*gwesp*), with a decay value of 0.4.

In the multivariate ERGMs (see Table 3, Model 2 to Model 4), we simultaneously modelled the observed neutral sender-receiver gossip and affective relationships networks. We assumed that the emergence of these networks was an endogenous process. This choice reflected the cross-sectional nature of our data and was more coherent with the content and formulation of the sociometric questions used to measure our dependent variables. These models allowed us to test our fourth and fifth research hypotheses.

In hypothesis 4, we postulated that individuals would be more likely to gossip neutrally with others they also have affective relationships, than expected by chance. We formalized this hypothesis in our model by including a cross-layer effect (entrainment) which represents the extent to which the two network ties align within the dyad (i.e., both neutral gossip and affective relationships ties are directed from i to j). In hypothesis 5, we stated that neutral gossip would be more likely to be reciprocated with an affective relationship, than expected by chance. We formalized this hypothesis in our model by including a cross-layer effect (exchange) which represents the extent to which the dyad exchanges ties of different types (neutral gossip from i to j, and affective relationships from j to i). All other parameters remained identical to those included in the single layer model, and were used to the define the single layer for the affective relationship network in the multilayer ERGMs.

Table 3 illustrates the parameters included for the estimation of each of our single and multilayer ERGMs. We estimated our models using the Monte Carlo Markov Chain Maximum Likelihood Estimation (MCMCMLE) method (Snijders et al., 2006) using the *ergm.multilayer* (Chen, 2023) package available for *R* (R Core Team, 2023).

Table 3. Parameters included in the single layer (Model 1) and multilayer (Model 2 – Model 4) ERGMs

Parameters	Observed	Model 1	Model 2	Model 3	Model 4
Neutral S-R gossip					
Arc	66	X	X	X	X
Reciprocity	9	X	X	X	X
Path closure (gwesp 0.4)	57.51	X	X	X	X
Seniority	450	X	X	X	X
Manager (sender)	30	X	X	X	X
Manager (receiver)	27	X	X	X	X
Affective relationships					
Arc	152		X	X	X
Reciprocity	33		X	X	X
Path closure (gwesp 0.4)	183.80		X	X	X
Seniority	892		X	X	X
Manager (sender)	33		X	X	X
Manager (receiver)	44		X	X	X
Cross-layer effects					
Entrainment	32		X		X
Exchange	32			X	X

3.4 Results

3.4.1 QAP

Table 4 shows that the neutral sender-receiver gossip network is positively correlated with the affective relationship network. This association is statistically significant at the 99% level. Between these two networks, there were 32 ties from i to j that co-occurred. This means that of the 66 observed ties of neutral sender-receiver gossip, 32 co-occurred with ties of affective relationships (48.5%).

Table 4. Pearson graph correlation of Neutral S-R gossip and Affective relationships networks with Quadratic Assignment Procedure (QAP) tests, and number of entrained arcs

	Affective relationships	
	Pearson graph correlation	*Number of entrained arcs*
Neutral S-R gossip	0.173 *	32
* p <0.001, QAP test with 1000 repetitions.		

However, beyond the alignment between our networks, we were interested in testing certain hypotheses that evaluate whether cross-layer effects (i.e., *entrainment*; and *exchange*) occurred after considering the internal logics of each network, as well as the attributes of the actors in the network. To overcome this limitation, we used Exponential Random Graph Models.

3.4.2 ERGMs (single layer)

Table 5 shows estimates and standard errors of single and multilayer ERGMs for neutral sender-receiver gossip and affective relationships networks (see Model 1). Goodness of fit of these models are reported in Appendix C.3.

Table 5. Single layer (Model 1) and multilayer (Model 2 – 4) ERGMs of Neutral sender-receiver gossip and Affective relationships networks

	Estimates (S.E.)			
Parameters	Model 1	Model 2	Model 3	Model 4
Neutral S-R gossip				
Arc	-4.757 (0.498) ***	-5.148 (0.546) ***	-5.171 (0.570) ***	-5.417 (0.583) ***
Reciprocity	-0.220 (0.568)	-0.279 (0.553)	-0.306 (0.552)	-0.585 (0.587)
Path closure (0.4)	1.077 (0.212) ***	1.049 (0.214) ***	1.048 (0.214) ***	1.030 (0.217) ***
Seniority	0.214 (0.077) ***	0.219 (0.081) ***	0.225 (0.083) ***	0.236 (0.085) **
Manager (sender)	0.455 (0.241) *	0.570 (0.250) **	0.454 (0.254) *	0.568 (0.261) **
Manager (receiver)	0.256 (0.253)	0.250 (0.261)	0.358 (0.263)	0.367 (0.273)
Affective relationships				
Arc		-2.910 (0.423) ***	-2.896 (0.424) ***	-2.687 (0.450) ***
Reciprocity		0.769 (0.304) **	0.784 (0.307) **	0.631 (0.310) **
Path closure (0.4)		0.913 (0.213) ***	0.891 (0.204) ***	0.889 (0.212) ***
Seniority		-0.025 (0.050)	-0.021 (0.052)	-0.056 (0.055)
Manager (sender)		-0.482 (0.217) **	-0.436 (0.215) **	-0.526 (0.224) **
Manager (receiver)		0.237 (0.208)	0.220 (0.206)	0.176 (0.214)
Cross-layer effects				
Entrainment		1.019 (0.275) ***		0.817 (0.300) ***
Exchange			0.974 (0.275) ***	0.780 (0.299) ***

*** p <0.01; ** p <0.05; * p <0.1

For hypothesis 1, we evaluated the coefficient of *reciprocity* in the neutral sender-receiver gossip network. The coefficient was negative but not statistically significant in the model. This indicates that the number of reciprocal substructures was not significantly different from what we would expect by chance, considering all other specified effects. This result allowed us to conclude that hypothesis 1 was not supported.

To test hypotheses 2 and 3, we examined the exogenous actor-relation effects in the ERGM of the neutral sender-receiver gossip network (Model 1). Specifically, we were interested in the effects of *seniority*, for hypothesis 2; and *manager (sender)*, for hypothesis 3 (see Table 5). Our results showed that the estimated coefficient of seniority was positive and statistically significant. This means that individuals with more years of experience working in the organization were more likely to send and receive neutral gossip ties, beyond any other endogenous structural effects and exogenous actor-relation effects specified in the model. This result contradicts our prediction for hypothesis 2, which postulated that workers who have joined the organization more recently would be more likely to send neutral gossip ties, than expected by chance. On the other hand, the estimated coefficient of managers as neutral gossip senders

was positive and statistically significant. This suggests that the likelihood of a manager being a neutral gossip sender was higher than expected by chance, beyond the effect of all other processes specified in the model. These results only confirm our third hypothesis.

3.4.3 ERGM (multilayer)

We evaluated two hypotheses related to effects between neutral sender-receiver gossip and affective relationships networks (hypotheses 4, and 5) using multilayer ERGM models (see Table 5). We were particularly interested in the alignment of these two networks ties within the dyad (hypothesis 4), and the extent to which the dyad exchanges these networks ties (hypothesis 5). This also allowed us to check our previous hypotheses while considering the effects between networks in our estimations.

To verify our hypothesis 4, we evaluated the *entrainment* effect of neutral sender-receiver gossip on affective relationships, estimated in model 2 (see Table 5). The estimate indicates that the likelihood of i sending neutral gossip to j, if the latter was selected by i as someone with whom they had an affective relationship, was higher than expected by chance, beyond the effect of all other processes specified in the model. This result confirms our fourth hypothesis: neutral gossip is more likely to be initiated with those with whom one has an affective relationship, than expected by chance. For hypothesis 5, we examined the *exchange* effect of neutral sender-receiver gossip with affective relationships, estimated in model 3 (see Table 5). The estimate indicates that the likelihood of i sending neutral gossip to j, if the latter nominated i as someone with whom they had an affective relationship, was higher than expected by chance, beyond the effect of all other processes specified in the model. This result confirms our fifth hypothesis: neutral gossip is more likely to be reciprocated with an affective relationship, than expected by chance.

The full model allows us to verify the robustness of our estimations. Following the reciprocity parameter of the network that allowed us to verify the first hypothesis, the estimates were identical in their direction and significance. This indicates that our first hypothesis about neutral gossip reciprocity was not confirmed. This finding is inconsistent with empirical research on gossip employing inference models for social network analysis (e.g., Ellwardt et al., 2012a; Ellwardt et al., 2012b; cf. Estévez et al., 2022a).

The estimates of exogenous actor-relation effects (hypotheses 2 and 3) were also consistent across the models. With these results, it is possible to confirm the rejection

of our second hypothesis, because individuals with more experience working in the organization were more likely to send neutral gossip ties, than expected by chance. On the other hand, it is possible to confirm our third hypothesis, because managers were more likely to be senders of neutral gossip ties, than expected by chance.

Following the effects between the networks of neutral sender-receiver gossip and affective relationships, the entrainment effect was consistent in direction and statistical significance across the models. This means, the results were robust and favorable to our fourth hypothesis: neutral gossip is more likely to be initiated with those with whom one has an affective relationship, than expected by chance. Second, the exchange effect between networks followed a similar pattern to the entrainment effect. Results were robust and confirms our fifth hypothesis: neutral gossip is more likely to be reciprocated with an affective relationship, than expected by chance.

Considering some of the other effects included as controls in the models, we found that transitivity was consistently positive and statistically significant in neutral sender-receiver gossip and affective relationships. These results suggest that the development of neutral gossip and affective relationships may tend towards closure. This is consistent with the theory that defines gossip as an activity that takes place in dense close-knit structures (Hannerz, 1967; Merry, 1984). Finally, estimates of managers as receivers of neutral gossip and affective relationship ties were positive but not statistically significant in our models.

3.5 Discussion and conclusions

Social relationships developed in the workplace have different functions and various forms. On the one hand, organizations have goals and objectives to fulfill, which require their members to engage in instrumental relationships to perform the daily tasks that help the achievement of these goals. Many of these relationships are imposed by the organizational structure itself, making them formal in nature. For instance, the formation of internal teams partly determines who will collaborate with whom. On the other hand, informal relationships develop naturally as people spend time together in these contexts, often even to share information relevant for collaboration. Gossip is one of these informal instances, and has multiple reasons for initiation as well as consequences for those involved (Grosser et al., 2010; Giardini and Wittek, 2019a, 2019b; Dores Cruz et al., 2021). Here, research has consistently shown some of its functions, such as obtaining information, influencing the behavior of its receivers, and developing other instrumental and informal relationships, such as affective ties

(Dunbar, 2004; Foster, 2004; Begemann et al., 2021; Sun et al., 2022). The latter are important for any organization as informal relationships can complement formal relationships by helping individuals be more cooperative and productive at work (Ellwardt at al., 2012a; Estévez et al., 2022b).

Our study emphasizes that gossip serves individuals to establish and maintain informal relationships in the workplace. More specifically, we suggest that gossip works as a social exchange mechanism (Rosnow, 2001), in which participants engage in reciprocity by either providing information or offering other relationships in return. In this case, we were interested in how gossip can help members of an organization to socially bond through the development of affective relationships. Understanding these relationships is key to reveal decentralized sources of group cohesion, interpersonal trust, social support, and shared morality (e.g., Coleman, 1988; Grosser et al., 2010; Grosser et al., 2012; McAndrew, 2019). In this sense, gossip can be one of the factors influencing the establishment of entry and exit barriers within informal groups that emerge in organizational settings. Other studies considering social capital have argued that affective relationships stimulate the flow of gossip among employees (e.g., Coleman, 1990; Borgatti and Foster, 2003; Burt, 2005) and that the social capital resulting from strong affective relationships, such as friendships and informal relationships, positively affects a variety of individual and organizational outcomes (e.g., Ellwardt et al., 2012a).

Our study shows a positive network association between neutral gossip and affective relationships, thus revealing that this type of conversation can also bring individuals socially closer together (Gluckman, 1963; Dunbar, 1996, 2004). Previous research has attributed this function primarily to positive and negative gossip (Gottman and Mettetal, 1986; Bosson et al., 2006; McDonald et al., 2007; Begemann et al., 2021).

Here, our findings cast new light on these connections, with a particular attention to neutral gossip between senders and receivers. First, we found that individuals are more likely to send neutral gossip to others with whom they have an affective relationship. This suggests that gossip can strengthen these relationships and that the latter pave the way for gossip. This result contributes to the literature that has underscored the presence of affective and instrumental relationships as preconditions for positive and negative gossip (e.g., Ellwardt, 2011; Methot et al., 2018). Second, our results support the notion that gossip can function as a social exchange mechanism (Rosnow, 2001). We found that individuals who receive neutral gossip are more likely to reciprocate with affective relationships. This finding is strengthened by the absence of endogenous reciprocity effects in the neutral gossip network. Consistent with social exchange theory (Blau, 1964; Homans, 1958, 1961; Emerson, 1976) and

its extension to the study of gossip (Rosnow and Fine, 1976; Rosnow, 1977, 2001), by sharing information about others, individuals may receive some valuable resource in exchange, such as an affective social relationship characterized by commitment and trust.

We evaluated two individual-level hypotheses. We found that individuals in managerial positions are more likely to initiate neutral gossip, than expected by chance. This can be understood in the light of previous research showing that neutral gossip serves an informational function (McDonald et al., 2007), and facilitates the establishment of group norms and values (Begemann et al., 2021). This suggests that managers could serve these functions without incurring the costs associated with negative evaluative information. This is especially true if managers can use other formal mechanisms for conflict resolution. On the other hand, our results do not support the hypothesis that employees who have joined the organization more recently are more likely to send neutral gossip ties, than expected by chance. Contrary to our predictions, the estimates suggest that individuals with more experience in the organization would be more likely to send neutral gossip ties, than expected by chance.

Our contribution has certain methodological and practical strengths. First, data collection was conducted within a project (EVILTONGUE) specifically designed to investigate the role of gossip in organizational contexts. The EVILTOUNGE team conducted a comprehensive analysis of the organizational settings, collecting qualitative and quantitative data at the individual and relational level. Prior knowledge developed within this project (e.g., Bodor-Eranus et al., 2016; Pápay, 2021; Estévez and Takács, 2022) facilitated our understanding of the empirical setting and data. This helped us to test conditional hypotheses about the social bonding function of gossip. We were able to use five relational dimensions to estimate a composite network of affective relationships. The advantage of this is that we considered for its operationalization some of the specific dimensions that have been underscored in the "intimacy" social function of gossip (e.g., Foster, 2004). The disadvantage, however, is that we cannot refer to any of the dimensions that make it up, so we could only refer to a latent network construct that represents affective relationships between coworkers. Second, to the best of our knowledge, besides one exception (Begemann et al., 2021), our study is one of the few directly investigating the relationship between neutral gossip and affective relationships in the workplace.

However, our study has also certain limitations. The cross-sectional nature of our data did not permit any causal explanation regarding the dynamics between neutral gossip and affective relationships. Longitudinal sociometric data collection is important for developing network studies that measure these dynamics over time

(Ellwardt, 2019). Second, the principles that motivated individuals in our sample to engage in neutral gossip is still unclear (e.g., Beersma and Van Kleef, 2012; Hartung et al., 2019). This is important because the valence in our data was reported by the receiver, and it is possible that the sender had a different motivation at the time of communication (Dores Cruz et al., 2021). For instance, Testori et al. (2023) showed that receivers were more likely to mistakenly interpret negative pro-social gossip as stemming from pro-self motives than vice versa. To enhance the understanding of the impact of gossip on the relationship between senders and receivers, future research could incorporate the measurement of social value orientations. A method already tested in the literature involves including six items in individual questionnaires (e.g., Murphy et al., 2011).

Further research is still needed to understand the relationship between neutral gossip and affective relationships. When selecting a sample to study this relationship, it is important to consider some aspects highlighted in the literature. For instance, empirical research has shown that socio-demographic composition of samples presents differences in the amount of positive, negative, and neutral gossip (Robbins and Karan, 2020). In our study, two-thirds of the members were women. It would be worthwhile to investigate contexts where there is a more gender balanced sample, as well as environments where the majority are men. This would help to evaluate the robustness of the results presented here to the composition of the groups being studied. Furthermore, it would be beneficial for future network studies to use multilayer models, such as those presented in our research, to observe networks of other dyadic relationships from the gossip triad in their association with affective relationships. For instance, it would be possible to test Burt's (2001) "echo hypothesis" by using networks of negative and positive gossip between receivers and targets and a network of affective relationships between the same individuals. Conducting studies in these scenarios could significantly enhance our understanding of the association between gossip and affective relationships.

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Chapter 4

Why do (don't) individuals gossip? A network study in a public administration organization[i]

Abstract: Gossip research has often portrayed individuals as tireless sharers of information, with little or no attention to the reputational consequences of information sharing for gossipers. However, potential gossipers may refrain from sharing information about a third party for different reasons. By applying "goal framing theory", we test how functional and affective dependency relationships between potential gossip senders and targets can motivate an individual to refrain from sharing negative gossip. We estimated Exponential Random Graph (p*) Models (ERGMs) for negative gossip in a public administration organization based in Budapest, Hungary. Our results show that individuals were less likely to gossip negatively about someone they also considered a friend (i.e., when the sender was affectively dependent on the target). Contrary to our predictions, individuals were more likely to gossip negatively about someone they also had to work with (i.e., when the sender and target were functionally dependent). This suggests that distinctions need to be made whenever studying the structural conditions of gossip behavior, especially for dyadic relationships in which targets are involved.

Keywords: Gossip; Networks; Goal Framing Theory; Organizations; ERGMs.

[i]This chapter was written in co-authorship with Francesca Giardini (University of Groningen), Federico Bianchi (University of Milan), and Flaminio Squazzoni (University of Milan).

4.1 Introduction

Gossip, i.e., the exchange of evaluative information about third parties in their absence (Foster, 2004), has attracted the interest of several disciplines with a significant growth as a research topic in the last two decades (Dores Cruz et al., 2021a). Gossip is one of the most influential reputational mechanisms for promoting cooperation among humans (Dores Cruz et al., 2021b; Giardini and Wittek, 2019b), and can play a valuable role for social control and social bonding. It influences its recipients, and can provide individuals and groups with valuable information about their social environment (Gluckman, 1963; Rosnow, 1977; Dunbar, 2004; Martinescu et al., 2019b). Indeed, research from various fields, including evolutionary psychology (Enquist and Leimar, 1993; McAndrew and Milenkovic, 2002; Kniffin and Wilson, 2005; McAndrew, 2019), and anthropology (Arno, 1980; Brenneis, 1984; Merry, 1984; Besnier, 2009, 2019; Boehm, 2019), has suggested that gossip is a widespread activity among individuals (see also Emler, 1994; Goldsmith and Baxter, 1996; Dunbar et al, 1997).

However, previous research has mostly portrayed gossip as a risk-free action with valuable benefits for both the sender and the receiver, resembling a spontaneous and effortless reflex (Taylor, 1994). This oversimplified picture does not account for the lack of gossip often observed in many different social situations (Giardini and Wittek, 2019b), which undermines the efficacy of informal social control. This can be due to the fact that sharing information about an absent third-party can have reputational consequences for those involved (Michelson et al., 2010; Martinescu et al., 2014), especially those who initiate gossip (e.g., Farley et al., 2010; Farley, 2011). It is therefore not surprising that the moral codes of almost all societies across time and cultures often have condemned gossip (Goodman and Ben-Ze'ev, 1994), leading to a widespread negative connotation of the concept (Foster, 2004). In this sense, gossip is often considered an exclusively selfish behavior aimed at manipulating and maliciously influencing others (Beersma and Van Kleef, 2012).

One assumption of much gossip research is related to the quality of the relationship between the sender and receiver. Sharing gossip requires a strong interpersonal trust relationship between these figures (Gambetta, 1994; Grosser et al., 2010; Ellwardt et al., 2012a, Ellwardt et al., 2012b). Indeed, gossip has been portrayed as a situation that involves connecting people who share a story (Burt, 2008). For instance, Merry (1984) emphasized that gossip is a statement of social intimacy and trust from the sender to the receiver: that is, the receiver is socially closer to the sender than to the target of the information. Although strong personal relationships, such as friendship, have been found to facilitate information sharing, this does not mean

that the absence of strong ties or the presence of only weak ties prevent people from sharing information about a third party (Ellwardt et al., 2012b). Another frequently reiterated claim links dense close-knit interpersonal networks to a high incidence of gossiping (Hannerz, 1967; Percival, 2000). However, an individual's embeddedness in structures characterized by closure, which represents a positive personal relationship between all participants in the "gossip triad" (Ellwardt, 2019), is not statistically related with the tendency to gossip (Wittek and Wielers, 1998). If people are close to each other, becoming the gossiper can be detrimental to one's social standing.

Closure has also been used to explain how reputations are formed and transmitted in social networks. The main argument is that closed networks are essential for shaping reputation (Burt and Knez, 1995; Burt, 2001, 2005, 2008). Two hypotheses can explain how closure affects the flow of information in a network (Burt, 2001). Both involve the combination of an individual's direct experience with vicarious experience. The difference lies in how these types of experiences are integrated. On the one hand, the "bandwidth hypothesis" suggests that network closure enhances information flow. This idea is consistent with balance theory (e.g., Heider 1958; Davis 1970), embeddedness (Granovetter, 1985), social capital (Coleman, 1988, 1990), and reputation theory in economics (Smelser and Swedberg, 1994). These theories often imply an enforcement mechanism whereby connected third parties can influence an individual's opinion of others. The bandwidth prediction is that an individual's opinion of others is correlated with the opinions of third parties, and networks evolve toward a state of equilibrium in which individuals connected by strong ties have similar opinions of others. According to this hypothesis, individuals and third parties share information about others and evolve toward a common opinion.

On the other hand, the "echo hypothesis" suggests that sharing information about absent third parties do not improve an individual's perception of others, but rather reinforce an existing predisposition toward them. This idea is consistent with social psychology notions of selective information disclosure in informal conversations (Higgings, 1992). In such interactions, it is common to follow the shared emotional tone. That is, when individuals express a predisposition toward someone, others are likely to select stories that reinforce that predisposition, creating an echo. Stronger ties to third parties create a stronger echo, and the repetition of coherent information makes individuals more confident in the image of another, polarizing opinions into extremes of trust and distrust. According to this hypothesis, differences of opinion between individuals and third parties can remain unspoken because the latter tend to confirm what the individual already believes or knows.

Giardini and Wittek (2019b) suggested that a missing aspect to be addressed in the literature is to investigate when, under which conditions, and why individuals may deliberately refrain from gossiping negatively about others. They argued that the theoretical and empirical models used to study gossip cannot adequately explain this puzzle. To overcome this limitation, they developed a theoretical framework for analyzing gossip (Giardini and Wittek, 2019b; Wittek and Giardini, 2023) based on "goal-framing theory" (Lindenberg, 1997; Lindenberg et al., 2006; Lindenberg and Steg, 2007, 2014). This approach offers six different mechanisms that explain why senders should refrain from gossiping based on the expected consequences for the actors involved (i.e., senders, receivers, and target) and their relationships. Understanding why gossip does not spread is important because its absence can explain why deviant behaviors are not exposed and subsequently punished (Wittek and Giardini, 2023). The goal-framing theory of gossip can provide a better understanding of why people (do not) gossip and, consequently, offer useful insights into individual motives, group dynamics, and collective behaviors that result from these information exchanges (Giardini and Wittek, 2019b). To empirically study this approach, they suggested that organizational contexts are ideal because they offer the presence of explicit structures, organizational cultures, and defined situations that provide the clear boundaries necessary to test for the presence of these mechanisms, and to verify whether affective and instrumental interdependence explain the lack of gossip in organizations (Wittek and Giardini, 2023).

The aim of this study is to test some of the predictions put forward by Giardini and Wittek (2019b). We aim to understand the sender's decision to withhold socially relevant information according to the goal frame activated by the functional and affective dependence between senders and targets of negative gossip. The setting of our study provided us with the opportunity to observe: (1) the structure of informal exchange of negative reputational information about third parties among co-workers (i.e., negative gossip network); and (2) the structure of affective and instrumental relationships among these co-workers (i.e., friendship and collaboration networks).

We analyzed the negative gossip network among the 24 employees in an Hungarian public administration organization. We focused on the dyads representing the gossip's senders and targets (e.g., see "the gossip triad" in Wittek and Wielers, 1998; Ellwardt, 2011; Ellwardt, 2019). We examined the impact of affective and instrumental interdependencies using the friendship and collaboration networks among the co-workers as exogenous effects. To do so, we analyzed the negative gossip networks using Exponential Random Graph (p*) Models (ERGMs) (Lazega and Pattison, 1999; Robins et al., 2009). This allowed us to test hypotheses involving exogenous effects of

friendship and collaboration networks on the generative process of the negative gossip network.

The remainder of the paper is organized as follows. Section 2 presents the background of our research and our hypotheses. Section 3 describes the data collection and the methods used for data analysis. Section 4 presents the results and contrasts them with the hypotheses. Section 5 discusses the main findings, comments on limitations, and implications for future research avenues on the goal-framing theory of gossip.

4.2 Research background and hypotheses

4.2.1 Interdependence in the gossip triad

Workplace gossip is a behavior whose occurrence and content (i.e., positive, neutral, or negative) are shaped by structural dimensions (Wittek and Wielers, 1998; Estévez and Takács, 2022). Empirical studies on gossip structures have primarily been approached through social network analysis (Ellwardt, 2019). Social network analysis enables the detailed study of the relationships between the different actors involved in these information exchanges (i.e., sender-receiver, receiver-target, and sender-target), collectively known as the "gossip triad" (Michelson et al., 2010; Giardini and Wittek, 2019a). Actors in the gossip triad, i.e., the sender, the target and the receiver, can be linked to each other by various kinds of ties which can express the valence of the relationship, for instance positive as friendship or negative as dislike, but they can also express the fact that the actors are in a relationship of interdependence.

Approaches to dependency in social relationships are derived from social exchange theory (SET; for classic references see Blau, 1964; Emerson, 1976). This association is implied by the argument that social exchange is inherently a joint or shared activity (Lawler and Thye, 2006), which is implicit in most of the social exchange literature (Homans, 1961; Emerson, 1972a, 1972b; Kelley and Thibaut, 1978). For instance, in power dependence theory (Emerson, 1972a, 1972b), the key assumption is that the power of an actor A over an actor B is equal to the dependence of B on A; or in the concept of activities described by Homans (1950) as a fundamental dimension in interactions or group settings. These approaches are typically illustrated with functional dependence relationships, i.e., when individuals must rely on the other to provide resources or actions (Balliet et al., 2017), such as to adequately perform their own tasks or to achieve a common goal. However, dependence can also have

cognitive-affective sources, such as reliance on socio-emotional support (Lindenberg, 1997; Wittek and Giardini, 2023). In this sense, shared activities generate or amplify emotional responses that affect the strength of group affiliations or attachments, which are the source and context that generate interdependencies and exchange patterns (Lawler and Thye, 2006).

An influential argument in the literature establishes a direct link between interdependence and gossip. According to the weapon of the weak argument (Scott, 1985, 1990), those who are dependent on a powerful actor have an interest in sharing information about that person. Gossip allows them to build and strengthen coalitions, i.e., to form a resistance. However, this argument overlooks the consequences of interdependence with a powerful party. For instance, the harm that the target can cause to weaker parties (Wittek and Giardini, 2023). Being aware of the negative externalities and vulnerabilities that gossip can cause can lead individuals to change their focus and avoid potential losses or simply orient themselves towards preserving their resources (Giardini and Wittek, 2019b). In this sense, dependence on others for the accomplishment of a task or for emotional support and advice can affect the decision to gossip about them. First, because of the expected consequences on the relationship with the target. Second, because of the relationship between the receiver and the target. For instance, if someone knows that I am "a good friend" with the target, they will be less likely to report negative information to me, either because I will downplay it or because I will be annoyed by it.

In sum, being aware of the kind of interdependence among actors can shape the choice of refraining from gossip (Lindenberg, 1997; Lindenberg et al., 2006; Lindenberg and Steg, 2007, 2014). By combining interdependence and goal framing theory, Giardini and Wittek (2019b) and Wittek and Giardini (2023) argued that the decision to gossip can be explained on the basis of the different goals of the gossip sender which are activated by the social and relational context.

4.2.2 Goal-framing theory of gossip

Goal-framing theory is a theory about human motives that can be used to understand behavior related to conformity to norms and conditions promoting it. The key assumption is that human cognition is dominated by a single overarching mindset that lies in the cognitive foreground and therefore "sets the mind" by structuring the related lower-level cognitions and motivations (Wittek and Giardini, 2023). Overarching mindsets are also called "goal frames": they shape what individuals pay attention to, what they consider important, the kind of knowledge and experience

they draw on, and how they generally understand a situation (Lindenberg and Foss, 2011; Lindenberg, 2015: 150).

This theoretical approach emphasizes the significance of social contexts in defining different overarching goals that guide or influence individuals' decisions and actions. In each situation, one goal is more prominent than others, and their saliency is determined a priori. Goal-framing theory can be applied to explain how the interdependence between actors in the gossip triad can make salient either the gain goal frame or the normative goal frame, thus overriding the hedonic goals, and thereby tempering the inclination to gossip (Giardini and Wittek, 2019b).

Three main goals that may prevail in a given context are hedonic goals, gain goals, and normative goals (Lindenberg and Steg, 2007; Foss and Lindenberg, 2013). The hedonic goal focuses on feeling better right now, therefore maximizing pleasurable situations and positive experiences, and minimizing unpleasant ones. The gain goal focuses on improving one's resources in the long-term. It relates to investments and strategic behavior aimed at improving the gains and standing of the actor. Finally, normative goals prioritize appropriate behavior for the collective, i.e., "doing what is right for the group". A salient normative goal frame makes individuals less sensitive to changes in personal resources or how one feels right now.

Research on gossip has largely described mechanisms where *hedonic gratification* predominates because of curiosity satisfaction, entertainment and sense of belonging (Wittek and Giardini, 2023). For instance, research into which motives trigger individual gossip behavior (e.g., Beersma and Van Kleef, 2012; Feinberg et al., 2012; Hartung et al., 2019) is still scarce. These studies have distinguished four types of social motives underlying gossip that have been discussed in the literature (Stirling, 1956; Rosnow, 1977; Foster, 2004): to influence others negatively; to inform; to enjoy; and to maintain group norms. These motives are clearly related to the three overarching goal frames (Wittek and Giardini, 2023). Gossip has been seen as a self-serving behavior aimed at manipulating others and influencing them in some malicious way, which corresponds to a salient gain goal frame. However, the desire to exert negative influence could also be driven by a hedonic goal frame, as discrediting a third party may enhance one's feeling of superiority. Gossip has also been described as an efficient means of gathering or disseminating information, mainly related to validating one's own view through social comparison (Wert and Salovey, 2004). Through gossip, individuals can acquire new information about the person being discussed or check whether others share the same views on the situation (Rosnow, 1977; Beersma and Van Kleef, 2012). Gossip can also be motivated by the desire to have a good time with others, i.e., for enjoyment. Several studies have shown that there are situations

in which people gossip just for the pleasure it renders (e.g., Stirling, 1956; Spacks, 1982; Gelles, 1989; Ben Ze'ev, 1994). Thus, both the enjoyment and information motives are rooted in a salient hedonic goal frame. Finally, gossip can be motivated by the normative goal to protect the group and its norms against harmful behavior (Gluckman, 1963).

However, not only can hedonic goals drive individuals to gossip; gain and normative goals can also influence the salience of the hedonic goal. For instance, this is echoed in perspectives that portray gossip as a mechanism for social bonding (Dunbar, 2004; Foster, 2004), in studies underscoring its relationship to emotions (Gambetta, 1994; Waddington and Fletcher, 2005; Martinescu et al, 2019a), in research emphasizing its function of social control by altruistically punishing free-riders who violate behavioral norms (Beersma and Van Kleef, 2012; Feinberg et al., 2012), and in studies that assume that individuals are rational gain-seekers (Burt and Knez, 1995; Burt, 2001, 2005). While the experience of being engaged in a gossip situation can be pleasurable, the perception that the tendency to gossip is widespread in one's immediate social environment may raise the salience of both gain and normative concerns. Being aware of the frequency of gossip means knowing the extent to which one is also likely to become a target: "what one hears about others can just as easily be said to others about oneself" (Foster, 2004: 86). The damage this can cause may increase the salience of the normative goal frame (Wittek and Giardini, 2023).

Gossip has been associated with a variety of *gain goals*. For instance, in models linking gossip to cooperation (e.g., Coleman, 1988, 1990), where gain-seeking rational individuals use gossip as a costless means to find out about norm violators. In these gossip models, gain-seeking is still the primary motive or salient mindset behind norm enforcement through gossip (Wittek and Giardini, 2023). Similarly, in organizations, gossiping can be motivated to gain or maintain different types of power (Kurland and Pelled, 2000). Another example of gossip being linked to a gain goal is in cooperation experiments (see, e.g., Milinski, 2019; Roddie, 2019). In these settings, instructions state that participants can earn money based on their decisions, which makes the gain goal more salient to them. Finally, the gain goal may be salient when gossip can be motivated by an individual's position within a network. For instance, according to the theory of structural holes (Burt, 1992, 2004, 2005, 2008), individuals in broker positions can gain advantage by using information to bring their contacts together (*tertius iungens*) or apart (*tertius gaudens*). Spanning structural holes allows individuals to extract different control and information benefits, and gossip can be instrumental to achieve this (Wittek and Giardini, 2023).

Normative concerns have long intrigued social scientists studying gossip. A first influential perspective considers gossip as a primary means of communicating social norms and behavioral expectations, typically by derogating norm violators (Baumeister et al., 2004). Thus, it serves as an efficient and effective tool to convey how people should behave, to indirectly punish norm violators, and to guide cooperative individuals to associate with each other (Dores Cruz et al., 2021a). Group protection and prosocial gossip play a key role in norm enforcement (Feinberg et al., 2012; Testori et al., 2022). However, research on gossip motives is ambivalent about normative obligations as a primary driver for sharing third-party information. The salience of this normative goal frame can either stimulate or inhibit gossiping tendencies. For instance, while moral outrage over antisocial behavior often triggers gossiping (Boehm, 2019), solidarity norms and the associated prominence of the normative goal frame may also inhibit the tendency to gossip (Wittek and Giardini, 2023).

Few studies have focused on variation in the amount of observed gossip, which is generally explained in terms of differences between potential gossipers. Research in social psychology has concentrated on a variety of intrapersonal antecedents, including experienced moods or emotions, personality traits, social and moral values, motivational characteristics, and sociodemographic characteristics (Sun et al., 2022). For example, based on the sociodemographic characteristics of the sender, it has been shown that people are more likely to gossip about others of similar age and gender (e.g., McAndrew and Milenkovic, 2002; McAndrew et al., 2007; Robbins and Karan, 2020). Similarly, the role of negative feelings and emotions has been discussed, for which gossip may be initiated in response to frustrating, unpleasant situations, or when some degree of anger, sadness, or disgust is felt (Waddington and Fletcher, 2005; Grosser et al., 2012; Martinescu et al., 2019a, 2019b, 2019c). However, relational factors may be equally important in explaining these differences. The role of dependencies among the three actors, and how these affect a potential sender's goal frame, could moderate the hedonic goal and make the gain goal frame or the normative goal frame more salient (Giardini and Wittek, 2019b).

Two propositions define how salient gain and normative goal frames can induce potential senders to refrain from gossiping, depending on their relationship with the target (Giardini and Wittek, 2019b). We refer here to the condition in which a salient gain goal frame inhibits gossiping as "deterrence," and when a salient normative frame tempers the sender's inclination to gossip as "solidarity." Table 1 provides a summary of these two propositions.

The first mechanism, *deterrence*, describes a situation in which potential gossip senders refrain from doing so due to their strong functional dependence on the gossip

Table 1. Two gossip inhibiting conditions based on Goal Framing Theory. Adapted from Giardini and Wittek (2019b: 6)

Relationship	Functional interdependence	Affective interdependence
Sender-Target	*Deterrence* The stronger a potential gossiper's functional dependence on the target of gossip, the more salient the goal to avoid potential losses resulting from the target's retaliation.	*Solidarity* Strong cognitive-affective interdependence between potential gossip senders and targets is likely to increase the salience of solidarity norms proscribing to harm each other.

target and the salient gain goal frame that this dependence induces (Giardini and Wittek, 2019b). In most gossip research, the third party being talked about is often portrayed as a passive object. However, targets can be much more proactive in their attempts to prevent damage to their own reputation, and deterrence is one of the various strategies that can be used to prevent it. Deterrence has been equated with the idea that gossip constitutes a social sanction (Gluckman, 1963; Keltner et al., 2008; Giardini, 2012; Pan et al., 2024). For instance, experimental studies on gossip have consistently shown that people care about their reputation (i.e., they are concerned about it), and the fear of being evaluated by other group members increases contributions and reduces free-riding (Piazza and Bering, 2008; Beersma and Van Kleef, 2011; Feinberg et al., 2012; Wu et al., 2015, 2016; Fonseca and Peters, 2018). The possibility of future retaliation by the target may be threatening enough to deter a potential sender from spreading incriminating information to others, even more so when potential receivers have some positive relationship or shared interests with the third party (Hess and Hagen, 2021). This led us to formulate our first hypothesis about deterrence as a mechanism that prevents an individual from initiating gossip about a potential target due to their functional interdependence, which may induce a gain goal frame in a particular situation.

Hypothesis 1: Individuals are less likely to gossip negatively about someone if they are functionally interdependent, than expected by chance.

The second mechanism, *solidarity*, describes a situation in which potential gossip senders refrain from doing so due to their strong emotional dependence on the gossip target and the salient normative goal frame that this dependence induces (Giardini and Wittek, 2019b). In other words, another condition that can prevent potential gossipers from sharing evaluative information about the target is when they are connected to them through a strong personal bond (Tassiello et al., 2018). Not harming someone with whom one feels solidarity is a socially desirable behavior (Lee et al., 2022), and constitutes a strong social norm (Giardini and Wittek, 2019b). When there is an emotional bond (e.g., friendship), not sharing harmful information about

that person may be a way to protect their reputation and position in the group, at least until the sender gathers more information about the situation. This argument is also related to the echo hypothesis (Burt and Knez, 1995; Burt, 2001, 2005, 2008), in which a sender shares information that is consistent with the receiver's predispositions toward the target, leading to polarized or biased reputations because disagreements may remain unspoken. Similarly, it has been shown that senders test the receiver's receptiveness to gossip and communicate the information only if the receiver signals openness to it (Eder and Enke, 1991). On the other hand, a person may also refrain from gossiping due to the consequences for the work climate in the organization (Wax et al., 2022). Particularly in situations where threats to team cohesion may pose a risk to all involved, it may be in a potential gossiper's best interest to keep the gossip to themselves. This led us to formulate our second hypothesis about solidarity as a mechanism that prevents an individual from initiating gossip about a potential target due to their affective dependence, which may make a normative goal frame salient in a particular situation (Hypothesis 2).

Hypothesis 2: Individuals are less likely to gossip negatively about someone if they are affectively interdependent, than expected by chance.

4.3 Research design and methods

4.3.1 The empirical setting

Network data and individual-level information were collected in the field in 2016 and 2018[1] in a Hungarian public administration organization based in Budapest. Subsequently, HR professionals and managers were interviewed to obtain qualitative information about the work environment[2]. They provided details on hiring processes, performance evaluation methods, years of experience within the organization, salary levels, and positions held by employees.

The organization had a well-defined structure, with internal teams working together on specific tasks. Six members coordinated and managed these teams. Staff responsibilities included writing project proposals and managing the finances of other

[1]The Hungarian Academy of Sciences - Centre for Social Sciences 'Lendület' Research Center for Educational and Network Studies (RECENS) carried out the EVILTONGUE project, led by Károly Takács. The data was collected as part of this project by Boróka Pápay and Eliza Bodor-Eranus. The project received funding from the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation programme (grant agreement N. ERC/648693).

[2]For more information on the information given here, see the work of Pápay (2021).

sector institutions. These tasks were constantly changing, so the organization was restructured accordingly. New members were selected because of performance or experience in similar previous roles. The organization did not provide recreational spaces or additional events beyond work for its employees. Relationships among employees were cordial but formal, and they rarely spent time together outside of working hours.

4.3.2 Data and variables

Relational and individual data were obtained through a CAPI questionnaire, individually administered by the employees. The process was supervised by researchers from the EVILTONGUE project. The survey was designed in a customized software that facilitated supervision and data cleaning. The survey took approximately 45 minutes, and a 100% response rate was achieved. The questionnaires were administrated in Hungarian (detailed information about the survey questionnaire is available in Chapter 1, and English translations of the sociometric information used in this study are available in Appendix D.1).

Individual-level data allowed us to control for the interaction between the characteristics of the organization's workers and the relationships they had with each other. Data on socio-demographic characteristics such as gender, age, seniority and job position in the organization were also obtained and are summarized in Table 2.

Table 2. Members' main characteristics

Members	24
Gender	Female = 18, Male = 6
Age (years)	Mean = 37.7 (SD = 7.59)
Age (range)	[25, 55]
Seniority (years)	Mean = 2.88 (SD = 1.03)
Seniority (range)	[2, 6]
Managers	6
Non managers	18

Variables

Data on negative gossip, affective, and functional dependency relationships were collected using the roster method. Respondents were asked to select the coworkers with whom they had relationships, as indicated in the question, by typing their names into the software (assisted with an auto-complete option). This method was used to identify the individuals with whom the respondents had relationships. The data were organized into binary adjacency matrices, where each cell X_{ij} represented the relationship between individual i and j. For instance, if i identified j as someone with

whom they hold the asked relationship, the corresponding cell X_{ij} in the matrix for that relationship was coded as 1; otherwise, it was coded as 0. Each matrix contained all possible combinations of pairs of individuals. Negative gossip relationships are the dependent variable of this study (see Figure 1).

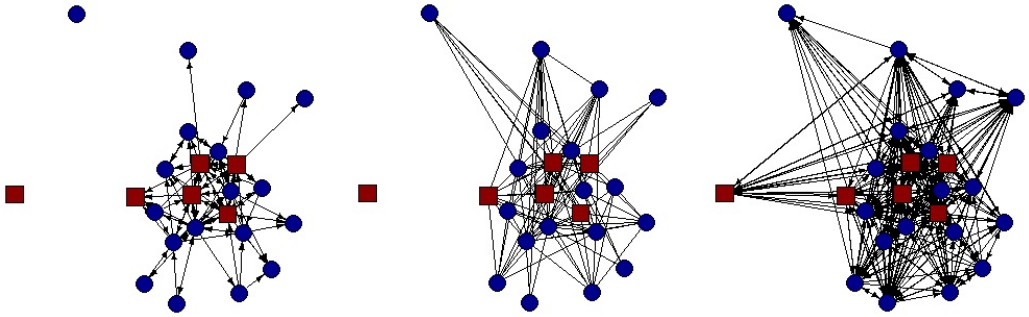
Negative sender-target gossip network

Information about negative gossip relationships was obtained through three questions (Ellwardt et al., 2012a; Ellwardt et al., 2012b; Ellwardt, 2019). This mode of collecting gossip relationships is based on the perspective of the receivers and has the advantage of being more accurate. Self-reported gossip is more likely to be affected by social desirability biases, as it is considered an undesirable social behavior (Nevo et al., 1994; Beersma and Van Kleef, 2012). First, respondents were asked to identify those colleagues who had shared personal information about another colleague with them in the past three months. This allowed us to identify gossip senders. Second, they were asked about whom the information was given, which permitted the identification of targets. Third, they were asked about the type of information received (i.e., positive, neutral, or negative), which made it possible to determine the tone or valence of the conversation. To identify the negative gossip matrix between senders and targets, we filtered information from the first two questions according to the tone of the conversation (i.e., with information from the third question). Then, for this matrix, we defined cell $X_{ij} = 1$ if individual i shared negative personal information about j to another colleague in the past three months, and $X_{ij} = 0$ otherwise.

Collaboration and friendship networks

Information on functional dependency was captured by a question on collaboration imposed by the organizational structure. This was freely reported by the respondents. To identify the collaboration matrix between workers we did two steps. First, we defined cell $X_{ij} = 1$ if i indicated that "have to cooperate with" j due to work obligations; otherwise, $X_{ij} = 0$. Then, we defined an undirected binary adjacency matrix, with a value equal to 1 for the dyads that were reciprocated; otherwise, 0. For affective dependency, we used friendship relationships. We defined cell $X_{ij} = 1$ in the friendship relationship matrix if individual i indicated that "likes" j or if j "is a good friend"; otherwise, $X_{ij} = 0$.

Figure 1. Negative S-T gossip, collaboration, and friendship networks. Blue circles represent regular workers and dark red squares represent managers



Negative S-T gossip Collaboration Friendship

Descriptive statistics

Table 3 reports descriptive graph-level statistics of the negative sender-target gossip, collaboration, and friendship networks. Figure 2 shows the in-degree and out-degree distribution of negative sender-target gossip relationships. The in-degree values indicate the number of individuals for whom a worker was the target of negative gossip, while the out-degree values indicate the number of individuals for whom a worker was the sender of negative gossip. In general, it can be seen that none of the distributions were normal. For the in-degree distribution, thirteen employees were targets of negative gossip from four or more different co-workers. Only two members were not targets of negative information from another colleague. For the out-degree distribution, ten employees were senders of negative gossip about four or more different co-workers. Seven members were not senders of negative information about another colleague.

Table 3. Graph-level descriptive statistics

	S-T Gossip	Collaboration	Friendship
Relationships	Directed	Undirected	Directed
Ties	92	103	299
Density	0.167	0.373	0.542
Mean in/outdegree	3.833	8.583	12.458
Std.dev. indegree	2.884	4.800	3.923
Indegree centralization	0.234	0.447	0.342
Std.dev. outdegree	3.942	4.800	5.013
Outdegree centralization	0.507	0.447	0.388
Isolates	2	1	0

Figure 3 shows the same distributions differentiated by position within the organizational structure. Five out of six managers were targets of negative gossip from four or more different co-workers, while four out of six managers were senders of neg-

ative gossip about four or more different co-workers. Two employees were neither targets nor senders of negative gossip, i.e., they were isolated in the network (see Table 3).

Figure 2. Negative S-T gossip in-degree (A) and out-degree (B) distributions. Red lines represent the mean

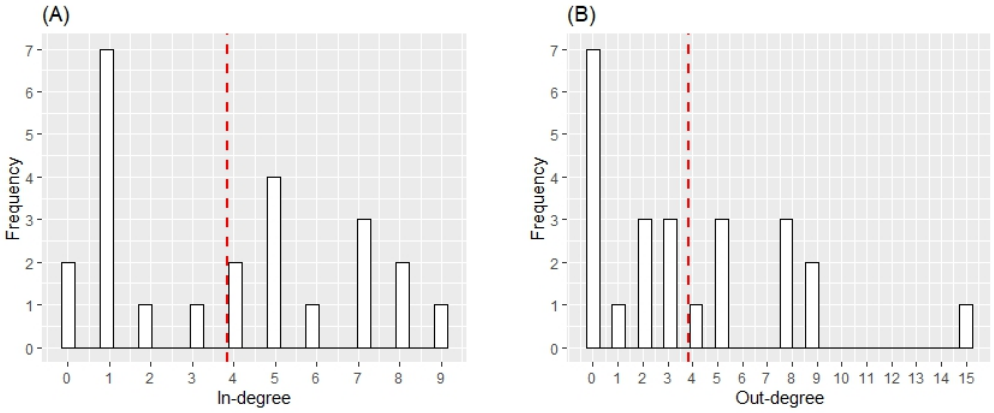


Figure 3. Negative S-T gossip in-degree (A) and out-degree (B) distributions by position in the organization. Red lines represent the mean of each position

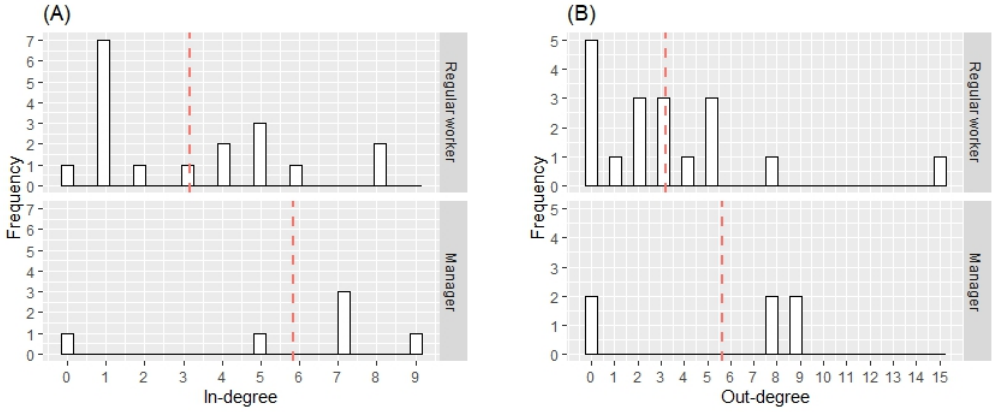


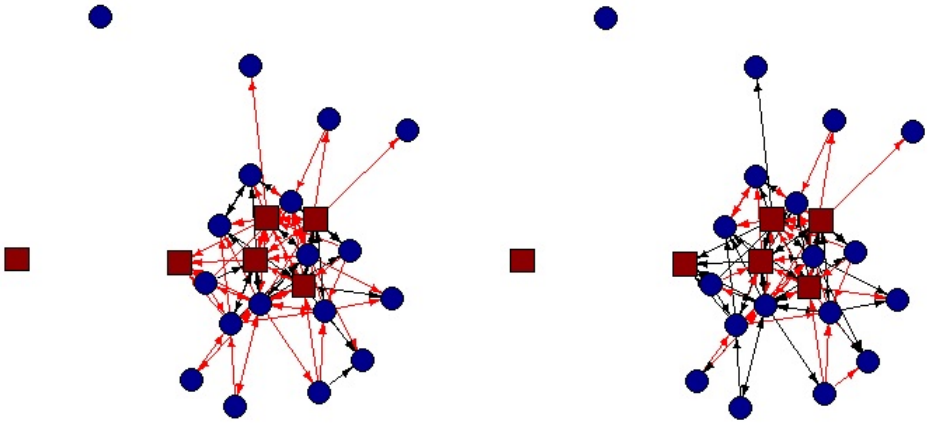
Table 4 shows the proportion of overlapping ties between negative sender-target gossip, friendship, and collaboration networks. The diagonal corresponds to the number of ties in each network. The lower diagonal reflects the proportion of overlapping ties with respect to friendship and collaboration. For instance, of the 299 friendship ties from i to j, i gossiped negatively about j in 14.0% of them. For collaboration networks, the calculation of the proportion of overlapping ties was slightly different. Since the collaboration network was defined as undirected from the reciprocal ties, this means that there were 206 directed relationships. Of these 206 directed ties from i to j, in 30.1% of them i gossiped negatively about j; and in 53.9% of them i declared

that "likes" j or j "is a good friend". The upper diagonal represents the proportion relative to negative gossip and friendship, and the interpretation follows the same logic. Figure 4 shows the negative sender-target gossip network with the overlapping ties of collaboration and friendship.

Table 4. Proportion of overlapping ties between negative S-T gossip, collaboration, and friendship networks

	S-T Gossip	Friendship	Collaboration
S-T Gossip	92	45.6%	67.3%
Friendship	14.0%	299	37.1%
Collaboration	30.1%	53.9%	103

Figure 4. Negative S-T gossip network with collaboration and friendship overlapped ties (in red). Blue circles represent regular workers, and dark red squares represent managers



Negative S-T gossip and collaboration

Negative S-T gossip and friendship

4.3.3 Analytical strategy

Our hypotheses were tested using Exponential Random Graph Models (ERGMs) for the negative sender-target gossip network (Lusher et al., 2013). Statistical aspects of ERGMs for social network analysis can be found in Chapter 1.

In the ERGMs (see Table 5, Models 1 to 3), we estimated the occurrence of the observed negative sender-target gossip network. In the first hypothesis, we evaluated if individuals were less likely to gossip about others when they were functionally dependent, than expected by chance. This hypothesis was operationalized with a covariate network effect (exogenous) of entrainment, which captured the tendency to observe negative gossip from a sender towards a target when the sender also had to collaborate with the other individual. In the second hypothesis, we evaluated if individuals were less likely to gossip about others when they were affectively depen-

dent, than expected by chance. This hypothesis was also operationalized with an entrainment effect, indicating the tendency to observe negative gossip from a sender towards a target when the former also considered the latter as a friend. To control for other confounding processes, we also specified the models with endogenous structural effects, and exogenous actor-relation effects.

Table 5. Parameters included in the ERGMs (Model 1 – Model 3)

Parameter	Model 1	Model 2	Model 3
Structural effects			
Arc	X	X	X
Reciprocity	X	X	X
Popularity (in-degree)	X	X	X
Activity (out-degree)	X	X	X
Path-closure (transitivity)	X	X	X
Actor-relation effects			
Position (1 = Manager)			
Ego	X	X	X
Alter	X	X	X
Similarity	X	X	X
Seniority (in years)			
Ego	X	X	X
Alter	X	X	X
Similarity	X	X	X
Covariate network effects			
Entrainment			
Collaboration network	X		X
Friendship network		X	X

For within-network structural effects, we specified two endogenous structural parameters: reciprocity, and path closure. For the latter, we used a network statistic known as geometrically weighted edgewise shared partnerships (*gwesp*), with a decay parameter of 0.5. We also included employee "position" (with a value of 1, identifying managers) and "seniority" (in years) as individual-level control variables (i.e., actor-relation effects). This results in three effects for each variable: ego effects assess to what degree the attribute of the focal actor affects his or her negative gossiping behavior; alter effects assess to what degree the attribute of colleagues in the organization (i.e. the potential target) affects the focal actor's negative gossiping behavior toward these colleagues; similarity effects assess to what degree being similar or different on specific attribute variables affects the focal actor's negative gossiping behavior toward potential targets.

We estimated our models using the Monte Carlo Markov Chain Maximum Likelihood Estimation (MCMCMLE) method (Snijders et al., 2006) using the *ergm* package available for *R* (Hunter et al., 2008; Handcock et al., 2018).

4.4 Results

4.4.1 QAP

Table 6 shows the correlations between the negative sender-target gossip network and the collaboration and friendship networks. The correlation value of the negative sender-target gossip network with the collaboration network was positive and statistically significant at the 99% confidence level. The correlation of the negative sender-target gossip network with the friendship network was negative. However, this relationship was not statistically significant.

Table 6. Pearson graph correlation of negative S-T gossip collaboration, and friendship networks with Quadratic Assignment Procedure (QAP) tests

	S-T Gossip	Friendship	Collaboration
S-T Gossip	92		
Friendship	-0.076	299	
Collaboration	0.278 ***	-0.004	103

*** p <0.01; ** p <0.05; * p <0.1

With the Quadratic Assignment Procedure correlations (QAP; Krackhardt, 1987), we were only able to infer the association between different pairs of networks at the dyadic level. However, beyond the networks alignment, we were interested in testing our hypotheses while controlling for other structural, actor-relation, and cross-network effects. Exponential Random Graph Models or ERGMs, allowed us to overcome this limitation (Zhao and Rank, 2013; Cranmer et al., 2020).

4.4.2 ERGM

Table 7 show the estimates and standard errors of the ERGMs for the negative gossip network. Goodness of fit of the models are reported in Appendix D.2.

Collaboration network entrainment

To verify our first hypothesis, we evaluated the entrainment effect of collaboration on negative sender-target gossip, estimated in model 1 (see Table 7). Our model shows that the estimated coefficient of the collaboration entrainment was positive and statistically significant. The model shows that i was more likely to gossip negatively about j if they had to collaborate (i.e., if they were functionally dependent), controlling for all the other specified effects. This means that the likelihood of i gossiping negatively about j, if they were also dependent to do their work was higher than expected by

Table 7. ERGMs of Negative sender-target gossip (Model 1 – Model 3)

	Model 1	Model 2	Model 3
Structural effects			
Arc	-3.814 (0.654) ***	-3.877 (0.603) ***	-3.763 (0.633) ***
Reciprocity	1.347 (0.428) ***	1.498 (0.415) ***	1.331 (0.421) ***
Popularity (in-degree)	-0.775 (0.964)	-0.729 (0.879)	-0.769 (0.911)
Activity (out-degree)	-3.005 (0.924) ***	-3.059 (0.879) ***	-2.962 (0.863) ***
Path-closure (transitivity)	0.140 (0.210)	0.198 (0.210)	0.131 (0.207)
Actor-relation effects			
Position (1 = Manager)			
Ego	0.342 (0.280)	0.231 (0.259)	0.353 (0.287)
Alter	0.693 (0.316) **	0.648 (0.308) **	0.773 (0.321) **
Similarity	0.352 (0.276)	0.457 (0.274) *	0.424 (0.287)
Seniority (in years)			
Ego	0.254 (0.123) **	0.329 (0.128) **	0.265 (0.137) *
Alter	0.239 (0.154)	0.368 (0.148) **	0.308 (0.155) **
Similarity	-0.285 (0.124) **	-0.278 (0.124) **	-0.341 (0.134) **
Covariate network effects			
Entrainment			
Collaboration network	0.816 (0.255) ***		0.832 (0.245) ***
Friendship network		-0.603 (0.245) **	-0.563 (0.251) **

*** p <0.01; ** p <0.05; * p <0.1

chance, beyond the effects of all other processes specified in these models. These results go in the opposite direction of our first hypothesis: we argued that individuals would be less likely to gossip negatively about those on whom they were functionally dependent, than expected by chance.

Friendship network entrainment

For our second hypothesis, we evaluated the entrainment effect of friendship on negative sender-target gossip, estimated in model 2 (see Table 7). The estimates show that the friendship entrainment was negative and statistically significant. Our model shows that i was less likely to gossip negatively about j if i also considered j as a friend (i.e., if i was affectively dependent on j), considering all the other specified effects. This means that the likelihood of i gossiping negatively about j, if the former was also affectively dependent on the latter was lower than expected by chance, beyond the effects of all other processes specified in these models. These results are consistent with our second hypothesis, in which we argued that individuals would be less likely to gossip negatively about those on whom they were affectively dependent, than expected by chance.

Complete model and control variables

Finally, we estimated a model with all the structural effects, actor-relation effects, and covariate network effects (see Table 7, model 3). This allowed us to verify the robustness of our estimates. Following the entrainment effect of collaboration on negative sender-target gossip, the estimates were consistent in direction and statistical significance in the complete model. These results show that when both dependencies were considered, negative gossip was consistently more likely to be directed towards those with whom collaboration was also required (i.e., to those who senders were functionally dependent), than expected by chance. This would lead to reject our first hypothesis. On the other hand, the estimates of the entrainment effect of friendship on negative sender-target gossip were consistent in direction and statistical significance in this model. This means that when both dependencies were considered, negative gossip was consistently less likely to be directed towards those considered friends (i.e., to those who senders were affectively dependent), than expected by chance. Therefore, our second hypothesis was confirmed.

Considering some of the other effects included as controls in the models, we found that reciprocity estimates were consistently positive and statistically significant. This suggests that the likelihood of i gossiping negatively about j, and vice versa, was higher than expected by chance, beyond all other effects included in these models. In addition, the estimates show that there was no tendency toward path closure in negative sender-target gossip relationships. The estimates of managers' activity (*ego*) were positive but not statistically significant. This indicates that there were no differences based on this characteristic for senders. However, managers were more likely to be targets of negative gossip. This parameter was consistently positive and statistically significant in our models. This suggests that the likelihood of a manager being the target of negative gossip was higher than expected by chance, considering all the other specified effects. Finally, the effects of seniority indicate that those with more experience working for the organization were more likely to send negative gossip (*ego*); and that employees were more likely to gossip negatively about others with the same seniority in years (*similarity*). In other words, the larger the difference in years working for the organization, the less likely they were to gossip negatively about them.

4.5 Discussion and conclusions

Research on gossip has gained momentum in many disciplines, highlighting the potential of gossip to fulfill different functions and its widespread practice among individuals in various social contexts. However, a recurring problem is the oversimplification of

the decision to engage in gossip (Giardini and Wittek, 2019b), with studies portraying it almost as an instinctive and effortless act (Taylor, 1994), valued for its potential benefits to the group. Despite its prevalence, gossip has consequences for anybody involved (Michelson et al., 2010; Martinescu et al., 2014). A key assumption of much gossip research refers to the quality of the relationship between senders and receivers. For instance, sharing gossip requires a strong interpersonal trust relationship between them (Gambetta, 1994; Grosser et al., 2010; Ellwardt et al., 2012a; Ellwardt et al., 2012b). This argument is also supported by the idea that close-knit structures facilitate the transmission of reputations (Merry, 1984). Following the potential of closure in the flow of information in networks, Burt (2001, 2005, 2008) showed that individuals are more likely to receive information consistent with their predispositions towards another person. This means that disagreements between senders and receivers of gossip may remain unspoken, leading to polarized or biased reputations. Giardini and Wittek (2019b) proposed a theoretical model based on goal-framing theory to investigate why individuals (do not) participate in gossip in the first place. One of their main arguments was that existing theories and models employed so far have not been able to adequately explain when, under what conditions, and why individuals may consciously refrain from gossiping negatively about others.

Our study has tried to respond to this call by focusing on the application of two dependency conditions that might explain why senders may refrain from gossiping negatively about a target. Understanding the absence of gossip is important because it can explain why certain deviant behaviors neither are exposed nor subsequently punished (Giardini and Wittek, 2019b). We followed the premise that the hedonic motives that drive senders to initiate gossip may be moderated by gain and normative frames, depending on their relationship with the target in question. When a potential sender is functional dependent on the potential target, the hedonic motives for initiating gossip could be moderated by gain frames. In our analysis, we used a collaboration network to operationalize this functional dependence. We found that individuals were more likely to initiate negative gossip about someone with whom they also had to collaborate, than expected by chance. Unlike our initial hypothesis, this finding suggests that in organizational contexts such as the one we studied, gain goals are not sufficiently salient to moderate senders' hedonic impulses to gossip negatively. In organizational contexts where negative gossip is not socially undesirable (Goodman and Ben-Ze'ev, 1994; Foster, 2004) and is practiced to the same extent as other types of evaluative communication (Robbins and Karan, 2020), it may serve as a mechanism for social control (Coleman, 1988, 1990; Kniffin and Wilson, 2010) and emotional release (Begemann et al., 2021) to maintain the necessary functional relationships within an organization.

On the other hand, when a potential sender is affectively dependent on the potential target, the hedonic motives for initiating gossip could be moderated by normative frames. In our analysis, we used a friendship network to operationalize this affective dependence. We found that it was less likely for an individual to initiate negative gossip about someone they considered their friend, than expected by chance. This finding, consistent with our hypothesis, suggests that in organizational contexts such as the one we studied, normative goals may be sufficiently salient to moderate senders' hedonic impulses to gossip negatively. In these organizations, solidarity norms would be strong, and negative gossip would not be used as a means to harm those with whom one has affective ties (Tassiello et al., 2018; Lee et al., 2022).

Our study is also directly related to research on the structural dimensions that explain the occurrence and content of gossip in organizational contexts (e.g., Wittek and Wielers, 1998; Grosser et al., 2010; Michelson et al., 2010; Estévez and Takács, 2022). For instance, although it was not a specific hypothesis of this work, we highlight the tendency for reciprocity of negative gossip between senders and targets. In this sense, spreading negative gossip about someone can be understood as a form of relational aggression (Beersma and Van Kleef, 2012; Ingram, 2014; McAndrew, 2014; Davis et al., 2019). Given that negative gossip could be avoided through affective dependency relationships, it is possible that individuals prefer to share information about those who are not their friends or who are their rivals in these contexts (McAndrew et al., 2007; Hess, 2017; Hess and Hagen, 2019; Wyckoff et al., 2019). A second finding closely related to these studies, concerns the formal position occupied by potential gossip targets. Our results show that individuals in managerial positions were more likely to be targets of negative gossip. This finding is consistent with the weapons of the weak approach (Scott, 1985, 1990), and those who have argued that power dependence relationships shape gossiping behavior (e.g., Ellwardt et al., 2012b; Martinescu et al., 2019b), in which employees in lower formal positions would have an interest in conveying information about those in higher formal positions (McAndrew et al., 2007).

Our contribution has certain methodological and practical strengths. First, the data collection was conducted within a project specifically designed to investigate the role of gossip in educational and organizational contexts. The team conducted a comprehensive analysis of the organizational settings, collecting qualitative and quantitative data at the individual and relational level. This helped us to test conditional hypotheses about the functional and affective dependencies on negative gossip. Prior research developed within this project (e.g., Pápay, 2021; Estévez et al., 2022; Estévez and Takács, 2022) facilitated our understanding of the empirical settings and data.

Second, to the best of our knowledge, our work is the first to investigate deterrence and solidarity mechanisms in which an individual would consciously refrains from gossiping negatively about a target in organizational contexts.

However, our study has also certain limitations. First, the cross-sectional nature of our data prevented us from establishing any causality in the social mechanisms that might motivate an individual to refrain from negative gossip. Although there are difficulties and challenges in collecting longitudinal social network data, it is important to develop network studies that measure these dynamics over time (Ellwardt, 2019). Second, we lacked information about the principles (e.g., self-interest or pro-social) that motivate individuals in these organizations to engage in negative gossip (e.g., Beersma and Van Kleef, 2012; Hartung et al., 2019). One way to integrate these individual motives could be to include variables that may characterize individuals according to their interests. With this information, it would be possible, for instance, to evaluate specific tendencies to initiate or refrain from gossiping about someone (sender-target relationship); to decide whether to discuss with someone about a third party (sender-receiver relationship); or that an individual does not receive evaluative information about another person (receiver-target relationship). A method already tested in the literature is to include six items in individual questionnaires (e.g., Murphy et al., 2011).

Further research is still needed to apply the goal-framing theory to gossip in organizational contexts. For instance, in our study, we only observed the relationship between the sender and the target of negative gossip. However, in addition to deterrence and solidarity mechanisms, there are four other mechanisms, related to the sender-receiver and receiver-target dyads. Furthermore, we consider that social network analysis is well suited to the measurement needs to be analyzed in the theoretical perspective used in our study. In this sense, it would be ideal for future research to continue with the same analytical approach. In addition, agent-based models can be a fruitful approach to study these theories together. This could also be beneficial for the literature that has used them mostly as a method to study the emergence of gossip in the context of cooperation and the formation of individual reputations (e.g., Giardini and Conte, 2012; Giardini and Vilone, 2016; Giardini et al., 2017; Testori et al., 2022; Testori et al., 2023). These approaches could significantly improve our understanding of the motives that lead individuals to refrain from gossiping, as well as those that motivate them to initiate it.

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Appendix A

Chapter 1

A.1 Survey questionnaire

	Hungarian (original version)	English (translation)
N	**Kérdés**	**Question**
1	**Születési év**	**Birth year**
2	**Neme nő?**	**Gender**
3	**Irányítószám**	**Postal code**
4	**Település neve**	**Where (in which settlement) do you live?**
5	**Elképzelt helyzetek 1. Képzelje el, hogy párba állítjuk egy kollégájával. Azt, hogy melyik kollégájával, azt nem tudhatja. Ön dönti el, hogy mennyi pénzt ajándékozzunk Önnek és mennyit a Kollégájának. Kérjük, válassza ki A, B és C közül, amelyiket a legjobban szeretné.** *a. Ön kap 1350 forintot és a Kollégája 100 forintot.; b. Ön kap 1350 forintot és a Kollégája 700 forintot.; c. Ön kap 1300 forintot és a Kollégája 1350 forintot.*	**Imaginary situations 1. Imagine that you have been paired with one of your colleagues. You cannot know, with which colleague. You decide how much money each of you get as a gift. Please select the preferred answer from A, B and C.** *a. You get 1350 HUF and your coworker gets 100 HUF.; b. You get 1350 HUF and your coworker gets 700 HUF.; c. You get 1300 HUF and your coworker gets 1350 HUF.*
6	**Elképzelt helyzetek 2. A következő kérdés hasonló az előzőhöz, de NEM a KOLLÉGÁJÁRA, hanem egy számára ismeretlen személyre vonatkozik, aki egy másik cégnél dolgozik. Őt Ismeretlen-nek fogjuk hívni. Ön dönti el, hogy mennyi pénzt ajándékozzunk Önnek és mennyit az Ismeretlennek. Kérjük, válassza ki A, B és C közül, amelyiket a legjobban szeretné.** *a. Ön kap 1350 forintot és az Ismeretlen 100 forintot.; b. Ön kap 1350 forintot és az Ismeretlen 700 forintot.; c. Ön kap 1300 forintot és az Ismeretlen 1350 forintot.*	**Imaginary situations 2. This question is similar to the previous one; however, the other participant is NOT YOUR COWORKER but someone you do not know, and working for another company. We shall call them "unknown person". You decide how much money each of you get as a gift. Please choose your preferred option from the ones below (a., b., c.).** *a. You get 1350 HUF and the unknown person gets 100 HUF.; b. You get 1350 HUF and the unknown person gets 700 HUF.; c. You get 1300 HUF and the unknown person gets 1350 HUF.*

N	Kérdés	Question
7	**Az oszlopokban állításokat olvashat, a sorok a kollégái nevét tartalmazzák. Kérjük, jelölje meg azokat a cellákat, melyek tartalmát igaznak véli. Például ha az első sorban lévő kollégájával tud jól együttműködni, akkor jelölje meg az első sorban az első oszlopot.** *a. Ki az akivel jól együtt tud működni munkahelyi feladatok megoldásában?* *b. Munkaköri feladataiból adódóan kivel kell együttműködnie?* *c. Ki az, akivel egyáltalán nem működne együtt?*	**The rows below contain statements, while the columns contain the names of your coworkers. Please mark the cells whose content you claim to be true. For example, if you usually cooperate with the coworker named in the first column, mark that column.** *a. Who can you cooperate well with in solving workplace tasks?* *b. Who do you have to cooperate with, due to your job duties?* *c. Who would you not wish to cooperate with at all?*
8	**Kérjük, jelölje meg, hogy az elmúlt három hónapban milyen gyakran folytatott SZEMÉLYES BESZÉLGETÉST kollégájával? Jelölje a megfelelő oszlopot!** *Soha* *Ritkábban, mint havonta* *Körülbelül havonta* *Körülbelül hetente egyszer* *Hetente többször* *Nyolc, vagy több alkalommal hetente*	**Please indicate how often you conducted PERSONAL CONVERSATIONS with your coworkers in the past 3 months by marking the corresponding column.** *Never* *Less often than once a month* *About once a month* *About once a week* *Several times a week* *On eight or more occasions a week*
9	**Kérjük, jelölje meg, hogy az elmúlt három hónapban milyen gyakran folytatott beszélgetést MUNKAHELYI FELADATAIVAL KAPCSOLATBAN kollégájával? Jelölje a megfelelő oszlopot!** *Soha* *Ritkábban, mint havonta* *Körülbelül havonta* *Körülbelül hetente egyszer* *Hetente többször* *Nyolc, vagy több alkalommal hetente*	**Please indicate how often you conducted WORK-RELATED CONVERSATIONS with your coworkers in the past 3 months by marking the corresponding column.** *Never* *Less often than once a month* *About once a month* *About once a week* *Several times a week* *On eight or more occasions a week*
10	**Kérjük, mondja meg, hogy mennyire kedveli kollégáit! Jelölje meg a megfelelő oszlopot!** *Semmiképp nem barátkoznék vele* *Nem kedvelem* *Közömbös, semleges* *Kedvelem* *Jó barátom*	**Please tell us how much you like or dislike your coworkers by marking the corresponding column.** *I would definitely not be friend him/her* *I do not like him/her* *He/she is neutral to me* *I like him/her* *He/she is a good friend of mine*
11	**Melyik kollégáitól KAPOTT személyes információt egy harmadik kollégájukról az elmúlt három hónapban?** *Kiről?* *Milyen tartalmú információt?* *Ön szerint KI SZOKOTT ÖNRŐL negatív információt megosztani?*	**Which of your coworkers has GIVEN YOU personal information of another coworker in the past three months?** *About whom?* *What kind of information?* *WHO do you think shares negative information ABOUT YOU?*

N	Kérdés	Question
12	**Mennyire ért egyet az alábbi munkájával kapcsolatos kijelentésekkel? Kérjük, jelölje be. 1. Egyáltalán nem értek egyet; 5. Teljesen egyetértek.**	**Please indicate how strongly you agree with the following statements about your job. 1. Strongly disagree; 5. Strongly agree.**
	A munkám sikerélményt ad	*My work gives me a sense of achievement*
	A munkám során megvalósíthatom saját kezdeményezéseimet	*I can fulfill my own initiatives during my work above*
	Befolyással vagyok a saját munkám kimenetelére	*I can influence the outcome of my work*
	Elégedett vagyok a képzéssel, amit munkahelyemen kapok	*I am satisfied with the training I get*
	A munkám során fejleszthetem a képességeimet	*I have the opportunity to advance my skills during my work*
	Megfelelő mennyiségű fizetést kapok	*I am paid adequately*
	Elégedett vagyok a munkahelyi biztonságommal	*I am satisfied with workplace security*
	Elégedett vagyok a munkámmal	*I am satisfied with my job*
13	**Mennyire ért egyet az alábbi munkájával kapcsolatos kijelentésekkel? Kérjük, jelölje be. 1. Egyáltalán nem értek egyet; 5. Teljesen egyetértek.**	**Please indicate how strongly you agree with the following statements about your job. 1. Strongly disagree; 5. Strongly agree.**
	A cégem megfelelő fejlődési és előrelépési lehetőségeket biztosít számomra	*The company provides adequate opportunities for me to advance my skills and career.*
	A cégem megfelelő béremelési juttatási rendszert biztosít számomra	*The company provides an adequate raise system.*
	A cégem megfelelő elismerést biztosít számomra	*The company gives me adequate acknowledgement.*
14	**Összességében mennyire elégedett a munkájával? 1. Egyáltalán nem; 10. Teljes mértékben**	**Overall, how satisfied are you with your job? 1. Not at all; 10. Fully.**
15	**Mennyire ért egyet az alábbi, kollégáival kapcsolatos kijelentésekkel? Kérjük, jelölje meg. 1. Egyáltalán nem értek egyet; 5. Teljesen egyetértek.**	**Please indicate how strongly you agree with the following statements about your coworkers. 1. Strongly disagree; 5. Strongly agree.**
	Jól kijövök a kollégáimmal	*I get on well with my coworkers*
	A kollégáim jól végzik a feladatukat	*My coworkers do their job well*
	Jól tudunk együtt csapatban dolgozni	*We work well as a team*
	A kollégáimmal egy összetartó közösséget alkotunk	*My coworkers and I form a cohesive community*
16	**Mennyire ért egyet az alábbi, projektmenedzserekkel kapcsolatos állításokkal? Kérjük, jelölje meg. 1. Egyáltalán nem értek egyet; 5. Teljesen egyetértek.**	**Please indicate how strongly you agree with the following statements about project managers. 1. Strongly disagree; 5. Strongly agree.**
	A projektmenedzserek tekintettel vannak rám	*The project managers take my needs into account*
	A projektmenedzserek mindig adnak a véleményemre	*The project managers value my opinion*
	A projektmenedzserek tisztában vannak a munkavégzéshez szükséges igényeinkkel	*The project managers are aware of our workplace requirements*
	A projektmenedzserek teljes mértékben szabad kezet adnak a munkám során	*The project managers give me complete freedom to do my job*
	A projektmenedzserek pontosan megtervezik és számon kérik a feladataim	*The project managers plan and supervise my tasks precisely*

N	Kérdés	Question
17	**Mennyire ért egyet az alábbi céggel kapcsolatos kijelentésekkel? Kérjük, jelölje be. 1. Egyáltalán nem értek egyet; 5. Teljesen egyetértek.**	**Please indicate how strongly you agree with the following statements about your company. 1. Strongly disagree; 5. Strongly agree.**
	Úgy gondolom, hogy a cégen belül igazságosan oszlanak meg a bérek és juttatások	*I believe that in the company the wages and benefits are divided fairly*
	Úgy gondolom, hogy a cégen belül igazságosan oszlanak meg az előrelépési és fejlődési lehetőségek	*I believe that in the company the opportunities to advance one's skills and career are divided fairly*
	Úgy gondolom, hogy a cégen belül igazságosan elismerik a munkavállalókat	*I believe that in the company the employees are acknowledged fairly*
	A cég akkor tud jól teljesíteni, ha a munkavállalók sikeresen együttműködnek	*The company can be the most successful if its employees cooperate effectively*
	A cég akkor tud jól teljesíteni, ha a munkavállalók között egészséges verseny alakul ki	*The company can be the most effective if its employees share a healthy sense of competition between each other*
	A cégen belül jó a hangulat	*The atmosphere of the company is positive*
18	**Mennyire ért egyet az alábbi állításokkal? Kérjük, jelölje be. 1. Egyáltalán nem értek egyet; 5. Teljesen egyetértek.**	**Please indicate how strongly you agree with the following statements. 1. Strongly disagree; 5. Strongly agree.**
	Rengeteg időt és energiát fordítok a munkahelyemen a másokkal való kapcsolatépítésre.	*I spend a lot of time and energy on building relationships within the workplace*
	Képes vagyok a kollégáimmal könnyen és hatékonyan kommunikálni.	*I communicate easily and effectively with my coworkers*
	Próbálok valódi érdeklődést mutatni a kollégáim iránt.	*I try to be genuinely interested in my coworkers*
19	**Az oszlopokban állításokat olvashat, a sorok a kollégái nevét tartalmazzák. Kérjük, jelölje meg azokat a cellákat, melyek tartalmát igaznak véli.**	**The rows below contain statements, while the columns contain the names of your coworkers. Please mark the cells whose content you claim to be true.**
	Ezt a személyt nagyra értékelem	*I appreciate this person*
	Hallgatok a szavára	*I listen to him/her*
	Népszerű	*He/She is popular*
	Az ügyvezetők kedvence	*He/She is the executive's pet*
	Ha valamit jól akarok csinálni, az ő segítségét kérem	*I turn for his/her help, when I want something done right*
	Meg lehet bízni benne	*He/She is trustworthy*
	Jól végzi a munkáját	*He/she does his/her job well*
	Jobb akarok lenni nála	*I want to be better than him/her*
	Nem való ebbe a munkakörbe	*He/she is not suitable for his/her job*
	Nem való ebbe a csapatba	*He/She does not belong to the team*
20	**Ön szerint mit gondolnak a kollégái egymásról? Kérjük, jelölje meg. Saját magát is megjelölheti.**	**What do you think your coworkers think of each other? Please indicate below. You can include yourself among the answers.**
	A kollégák nagyra értékelik őt	*Colleagues appreciate this person*
	A kollégák hozzá fordulnak, ha azt szeretnék, hogy valami jól el legyen végezve.	*Colleagues ask for his/her help, when they want something done right*
	A kollégák lenézik őt	*Colleagues despise him/her*
	A kollégák hallgatnak a szavára.	*Colleagues listen to him/her*

N	Kérdés	Question
21	**Mit gondol, mely tulajdonságoktól lesz valaki népszerű a cégnél?**	**What do you think are the characteristics that make someone popular at your company?**
	Jó szakember	*Good professional*
	Barátságos	*Friendly*
	Csapatjátékos	*Team player*
	Intelligens	*Intelligent*
	Jóban van a menedzsmenttel	*Has a good relationship with the management*
	Pozitív a munkához való hozzáállása	*Has a positive attitude towards the job*
22	**Kérjük, jelölje meg, hogy mennyire ért egyet az alábbi állításokkal! 1. Egyáltalán nem értek egyet; 5. Teljesen egyetértek.**	**Please indicate how strongly you agree with the following statements. 1. Strongly disagree; 5. Strongly agree.**
	Úgy gondolom, hogy jelentősen többet keresek, mint az átlag magyar állampolgár.	*I believe I earn significantly more than the average Hungarian.*
	Úgy gondolom, hogy jelentősen többet keresek, mint a szakmámon belül dolgozók általában.	*I believe I earn significantly more than the average person in this field.*
	Úgy gondolom, hogy jelentősen többet keresek, mint egy átlagos dolgozó a cégemen belül.	*I believe I earn significantly more than an average employee of this company.*
	Úgy gondolom, hogy jelentősen többet keresek, mint egy átlagos dolgozó a cégemmél ugyanebben a munkakörben.	*I believe I earn significantly more than an average employee in my department.*
23	**Hány százaléknyi fizetésemelést kért a legutóbbi béralkunál/béremelésnél?**	**In percentages, how much raise did you requested the last time you received a raise?**
24	**Hány százalékkal emelkedett a nettó fizetése a legutóbbi béralkunál/béremelésnél?**	**In percentages, how much did your net salary increase the last time you received a raise?**
25	**Hány százalékos emelésre számít a következő béralkunál/béremelésnél?**	**In percentage, how much raise do you expect from the next raise?**
26	**Számít-e a közeljövőben előléptetésre?**	**Are you expecting a promotion in the near future?**
27	**Ha igen, milyen pozícióra számít?**	**If yes, what position do you expect?**
28	**Az oszlopokban állításokat olvashat, a sorok a kollégái nevét tartalmazzák. Kérjük, jelölje meg azokat a cellákat, melyek tartalmát igaznak véli.**	**The rows below contain statements, while the columns contain the names of your coworkers. Please mark the cells whose content you claim to be true.**
	Biztosan tudom, hogy mennyit keres	*I know for certain how much he/she earns*
	Nagyjából tudom, hogy mennyit keres	*I approximately know how much he/she earns*
	Csak tippelni tudok, hogy mennyit keres	*I can only guess how much he/she earns*
	Fogalmam sincs, hogy mennyit keres	*I have no idea how much he/she earns*
	Sokkal kevesebbet, mint én	*He/she earns much less money than I do*
	Kevesebbet, mint én	*He/she earns less money than I do*
	Nagyjából ugyanannyit, mint én	*He/she earns the same amount of money than I do*
	Többet, mint én	*He/she earns more money than I do*
	Sokkal többet, mint én	*He/she earns much more money than I do*
29	**Képzelje el, hogy ön az ügyvezető és a cég költségcsökkentést hajt végre. Jelölje meg azt a dolgozót, akiknek csökkentené a fizetését.**	**Imagine that you are the CEO who executes a cost reduction. Mark that employee whose wage you would reduce.**

N	Kérdés	Question
30	**Képzelje el, hogy ön az ügyvezető és a cég extraprofitra tett szert, melyet béremelés formájában szétosztana a dolgozók között. Jelölje meg azt a dolgozót, akinek növelné a fizetését.**	**Imagine you are the CEO and your company has made some extra profit, which he/she distributes among the employees. Mark that employee whose wage you would increase.**
31	**Melyik évben kezdett el dolgozni a jelenlegi munkakörében?**	**Which year did you start working at this position?**
32	**Melyik évben kezdett el dolgozni a cégnél?**	**Which year did you start working at this company?**
33	**Hányadik pozíciója ez ugyanennél a cégnél?**	**How many positions have you held at this company, including this one.**
34	**Melyik a legmagasabb befejezett iskolai végzettsége?** *1. Érettségivel nem rendelkezik; 2. Érettségi bizonyítvány; 3. Hagyományos képzésben megszerzett egyetemi vagy főiskolai oklevél; 4. Alapképzési egyetemi vagy főiskolai oklevél; 5. Mesterszintű egyetemi vagy főiskolai oklevél; 6. Doktori fokozat*	**What is your highest level of education completed?** *1. Did not graduate from High School; 2. High School Diploma; 3. University or college diploma acquired in traditional training; 4. Bachelors or equal degree; 5. Masters or equal degree; 6. PhD or advanced*
35	**Mi az eredeti szakképesítése?**	**What is your original qualification?**
36	**Kérjük, jelölje meg, hogy mennyire ért egyet az alábbi, céggel kapcsolatos állításokkal! 1. Egyáltalán nem értek egyet; 5. Teljesen egyetértek** *Szeretek a cégről beszélni a munkahelyemen kívüli embereknek* *Nem kötődöm érzelmileg a céghez* *Boldoggá tenne, ha a karrierem hátralevő részét ennél a cégnél tölthetném* *Ha egy másik cégtől kapnék egy jobb ajánlatot, akkor sem hagynám el a jelenlegi munkahelyem* *Váltogatni a munkahelyeket egyáltalán nem etikátlan* *Úgy tanítottak, hogy legyek lojális a cégemhez* *Bűntudatom lenne, ha kilépnék a cégtől* *Most nem lépnék ki a cégtől, mert kötelezettségeim vannak vele szemben*	**Please indicate how strongly you agree with the following statements about your company. 1. Strongly disagree; 5. Strongly agree.** *I enjoy discussing my organization with people outside* *I don't feel 'emotionally attached' to this organization* *I would be very happy to spend the rest of my career with this organization* *If I got another offer for a better job elsewhere I would not feel it was right to leave the organization* *Jumping from organization to organization does not seem at all unethical to me* *I was taught to believe in the value of remaining loyal to one organization* *I would feel guilty if I left the organization now* *I would not leave my organization right now because I have a sense of obligation to the organization*

Appendix B

Chapter 2

B.1 Sociometric questions

The questionnaire was administered in Hungarian, the mother tongue of all interviewees. In this appendix section, we present all sociometric questions used for the analysis in the original version (**HUN**), as well as in their respective English translation (**ENG**). The complete original version of the questionnaire applied in Hungarian and translated into English is reported in Appendix A.1.

1. **Nomination as cooperation partners**

HUN: Munkaköri feladataiból adódóan kivel kell együttműködnie?

- **ENG**: Who do you have to cooperate with, due to your job duties?

HUN: Ki az, akivel egyáltalán nem működne együtt?

- **ENG**: Who wouldn't you wish to cooperate with at all?

2. **Gossip**

HUN: Melyik kollégáitól KAPOTT személyes információt egy harmadik kollégájukról az elmúlt három hónapban?

- **ENG**: Which of your coworkers has GIVEN YOU personal information of another coworker in the past three months?

HUN: Kiről?

- **ENG**: About whom?

HUN: Milyen tartalmú információt? (pozitív; negatív; semleges)

- **ENG**: What kind of information? (positive; negative; neutral)

B.2 In-/Out-degree distributions

Figure 3. In-/out-degree distributions of positive gossip by seniority (Unit A). Nodes are colored by by formal position in the organization

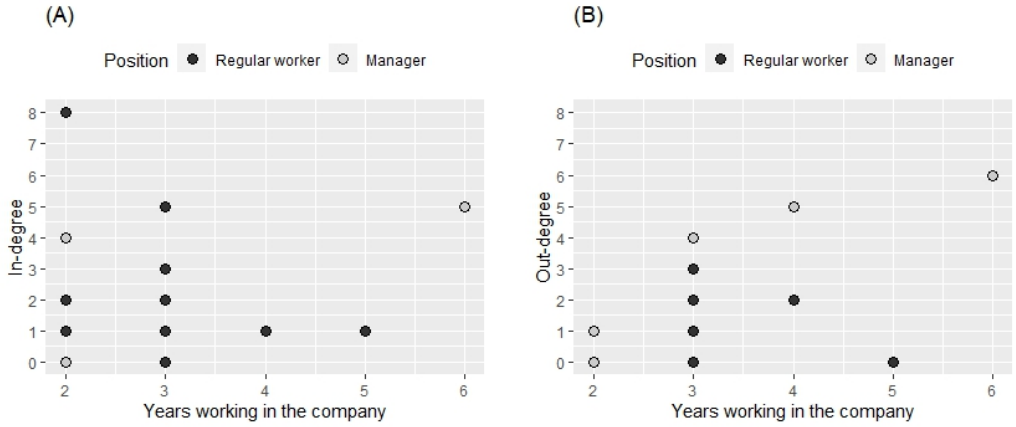


Figure 4. In-/out-degree distributions of positive gossip by position (Unit A). Red colored lines represent the mean for the respective position.

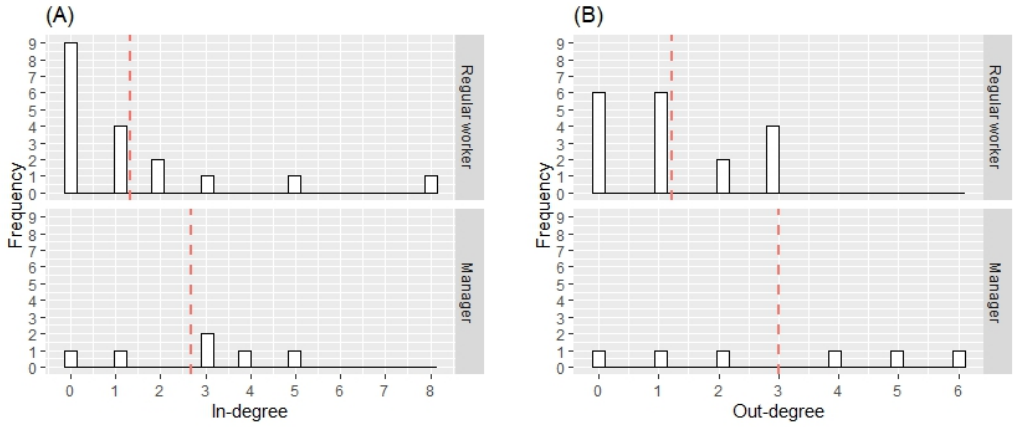


Figure 5. In-/out-degree distributions of negative gossip by seniority (Unit A). Nodes are colored by by formal position in the organization

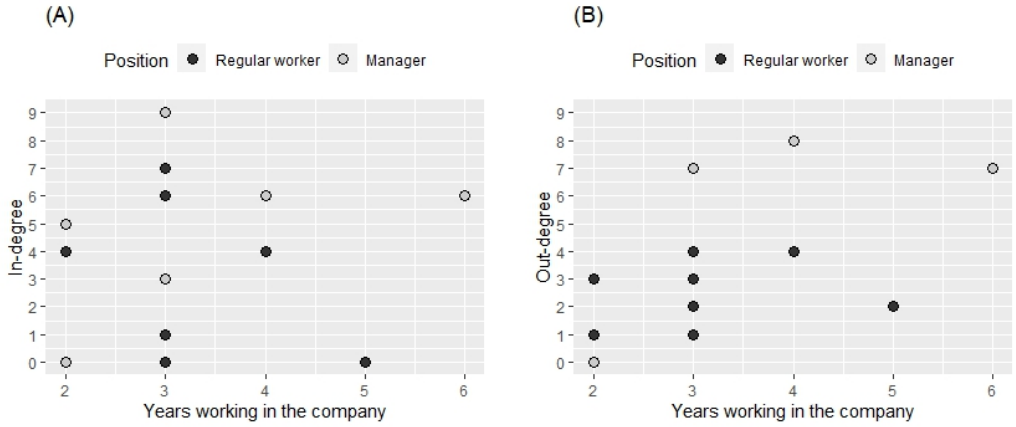


Figure 6. In-/out-degree distributions of negative gossip by position (Unit A). Red colored lines represent the mean for the respective position.

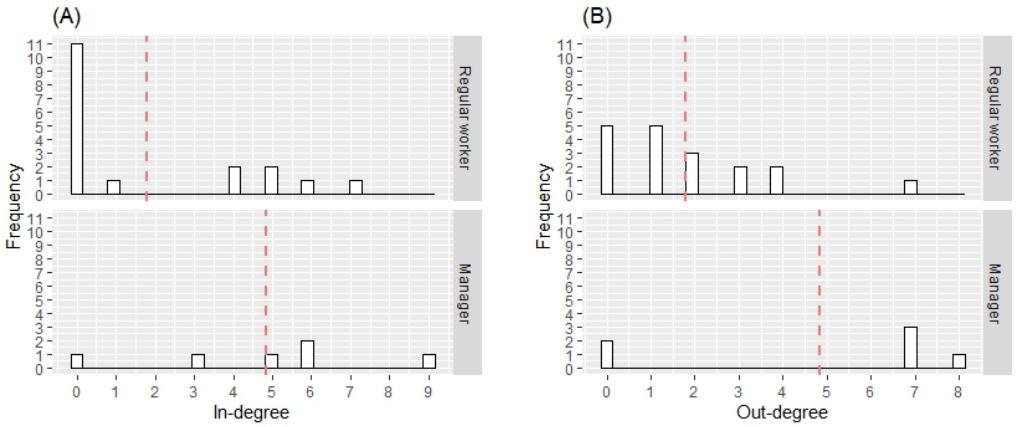


Figure 7. In-/out-degree distributions of positive gossip by seniority (Unit D). Nodes are colored by by formal position in the organization

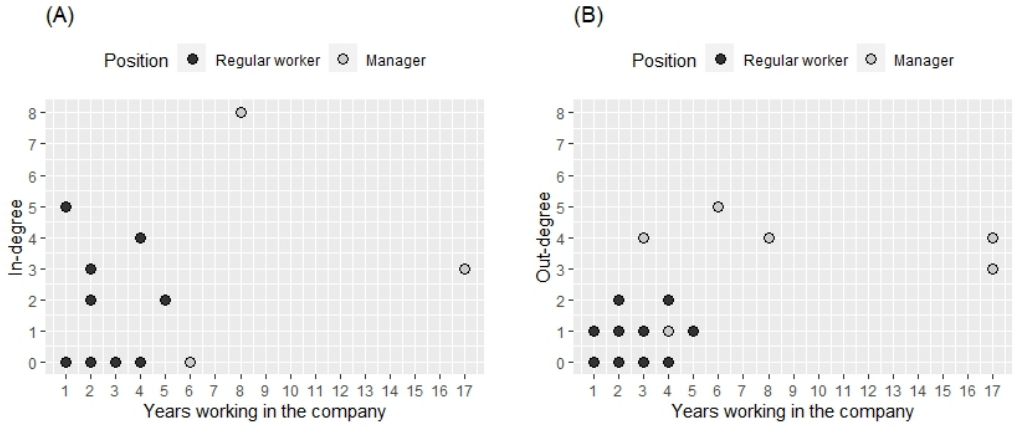


Figure 8. In-/out-degree distributions of positive gossip by position (Unit D). Red colored lines represent the mean for the respective position.

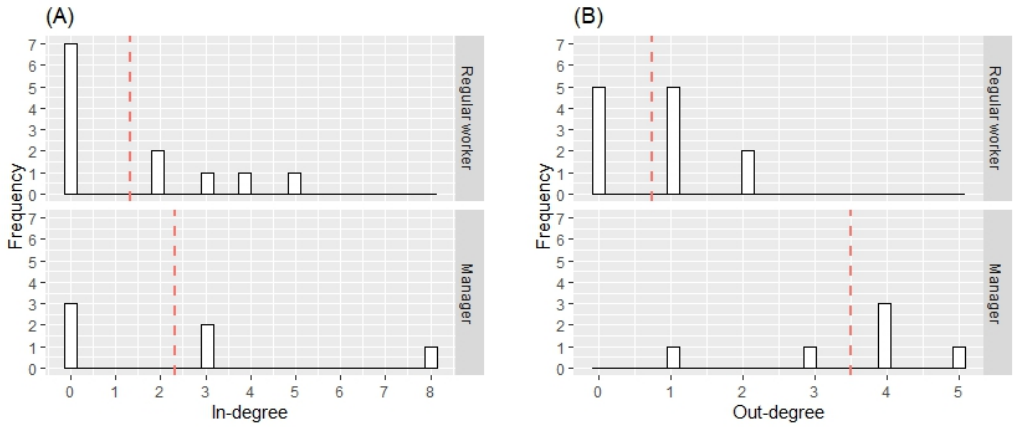


Figure 9. In-/out-degree distributions of negative gossip by seniority (Unit D). Nodes are colored by by formal position in the organization

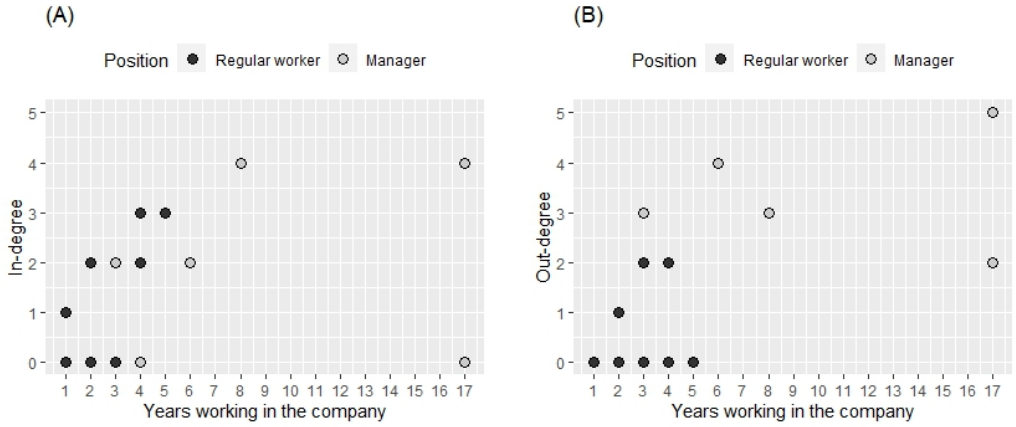
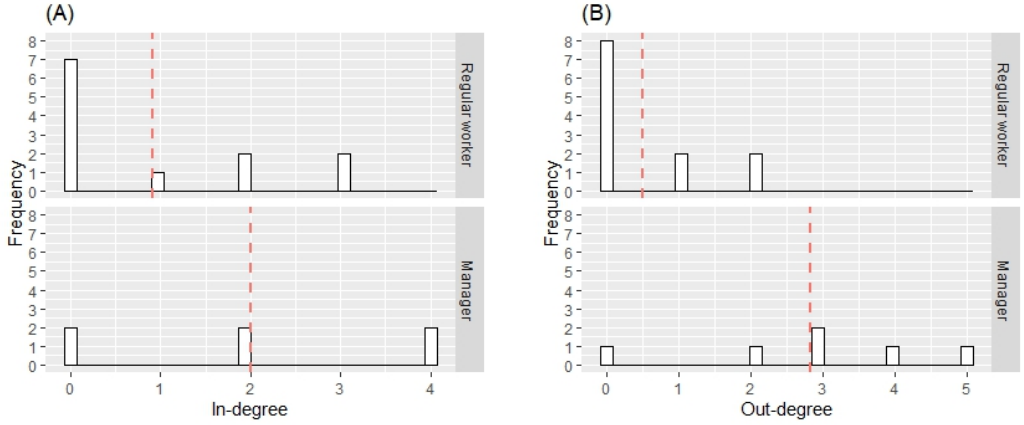


Figure 10. In-/out-degree distributions of negative gossip by position (Unit D). Red colored lines represent the mean for the respective position.



B.3 ERGMs goodness of fit

Table B.3.1. Goodness of fit of Model 1.1.
Observed values (Obs.) relate to empirical data, while minimum (Min.), mean, and maximum (Max.) relate to simulated networks.

Parameter	Obs.	Min.	Mean	Max.	p-value
Positive S-R gossip					
Arc	40	30	41.800	68	0.96
Reciprocity	4	0	4.390	12	1.00
Transitivity	16.700	1.000	19.250	60.600	0.96
Multiple connectivity	69.900	24.200	76.690	215.100	0.94
Manager (receiver)	16	4	16.670	31	1.00
Manager (sender)	18	7	19.320	36	0.96
Seniority	264	184	277.530	456	0.92

Table B.3.2. Goodness of fit of Model 1.2.
Observed values (Obs.) relate to empirical data, while minimum (Min.), mean, and maximum (Max.) relate to simulated networks.

Parameter	Obs.	Min.	Mean	Max.	p-value
Negative S-R gossip					
Arc	61	34	59.900	98	0.84
Reciprocity	12	1	11.700	25	0.96
Transitivity	62.600	8.390	59.900	129.000	0.78
Multiple connectivity	143.300	41.750	141.900	292.000	0.86
Manager (receiver)	29	9	27.900	50	0.92
Manager (sender)	29	11	28.800	54	0.92
Seniority	407	199	398.600	649	0.80

Table B.3.3. Goodness of fit of Model 1.3.
Observed values (Obs.) relate to empirical data, while minimum (Min.), mean, and maximum (Max.) relate to simulated networks.

Parameter	Obs.	Min.	Mean	Max.	p-value
Positive S-R gossip					
Arc	30	12	29.100	45	0.96
Reciprocity	4	0	3.500	9	0.86
Transitivity	17.400	1.000	15.600	50.900	0.72
Multiple connectivity	47.600	7.000	43.900	96.700	0.70
Manager (receiver)	14	4	13.000	24	0.84
Manager (sender)	21	6	20.400	41	0.90
Seniority	430	165	411.600	704	0.80

Table B.3.4. Goodness of fit of Model 1.4.
Observed values (Obs.) relate to empirical data, while minimum (Min.), mean, and maximum (Max.) relate to simulated networks.

Parameter	Obs.	Min.	Mean	Max.	p-value
Negative S-R gossip					
Arc	23	9	22.640	35	1.00
Reciprocity	3	0	2.680	11	0.96
Transitivity	10.200	0.000	9.340	39.100	0.72
Multiple connectivity	26.700	4.000	24.510	73.400	0.76
Manager (receiver)	12	4	11.640	22	1.00
Manager (sender)	17	6	16.440	33	0.96
Seniority	352	160	338.340	582	0.82

Table B.3.5. Goodness of fit of Model 2.1.
Observed values (Obs.) relate to empirical data, while minimum (Min.), mean, and maximum (Max.) relate to simulated networks.

Parameter	Obs.	Min.	Mean	Max.	p-value
Positive S-R gossip					
Arc	40	18	41.400	68	0.90
Reciprocity	4	0	4.080	12	1.00
Transitivity	16.700	0.000	17.910	57.300	0.74
Multiple connectivity	69.900	7.000	74.490	196.000	0.96
Manager (receiver)	16	4	16.280	31	1.00
Manager (sender)	18	7	18.480	34	0.98
Seniority	264	116	274.200	478	0.82
Cooperation partners					
Arc	300	275	300.090	319	1.00
Reciprocity	100	88	100.450	112	1.00
Transitivity	490.400	447.000	490.490	523.600	0.98
Manager (receiver)	84	71	83.510	97	1.00
Manager (sender)	64	51	63.720	74	1.00
Seniority	1859	1731	1857.050	1952	1.00
Cross-layer effects					
Entrainment	25	9	26.150	49	0.82

Table B.3.6. Goodness of fit of Model 2.2.
Observed values (Obs.) relate to empirical data, while minimum (Min.), mean, and maximum (Max.) relate to simulated networks.

Parameter	Obs.	Min.	Mean	Max.	p-value
Negative S-R gossip					
Arc	61	31	59.900	104	0.94
Reciprocity	12	1	11.900	28	0.94
Transitivity	62.600	10.400	60.800	145.000	0.82
Multiple connectivity	143.300	46.600	142.000	291.000	0.94
Manager (receiver)	29	12	28.000	51	0.94
Manager (sender)	29	10	27.900	48	0.94
Seniority	407	202	402.100	681	0.96
Cooperation partners					
Arc	300	282	301.100	322	0.98
Reciprocity	100	85	100.500	116	1.00
Transitivity	490.400	459.600	492.300	529.000	0.98
Manager (receiver)	84	76	84.300	97	1.00
Manager (sender)	64	55	65.100	76	0.94
Seniority	1859	1763	1864.600	1964	1.00
Cross-layer effects					
Entrainment	43	20	43.000	73	0.96

Table B.3.7. Goodness of fit of Model 2.3.
Observed values (Obs.) relate to empirical data, while minimum (Min.), mean, and maximum (Max.) relate to simulated networks.

Parameter	Obs.	Min.	Mean	Max.	p-value
Positive S-R gossip					
Arc	30	14	30.310	50	1.00
Reciprocity	4	0	3.960	10	1.00
Transitivity	17.400	0.000	16.970	53.400	0.82
Multiple connectivity	47.600	11.000	47.380	106.500	0.84
Manager (receiver)	14	6	14.130	28	1.00
Manager (sender)	21	9	21.130	43	0.94
Seniority	430	201	432.080	744	0.88
Cooperation partners					
Arc	155	140	155.960	176	0.98
Reciprocity	53	41	53.230	63	1.00
Transitivity	246.600	221.000	248.370	285.400	0.94
Manager (receiver)	70	61	70.710	79	0.92
Manager (sender)	65	57	65.550	77	1.00
Seniority	1802	1651	1811.780	2001	0.88
Cross-layer effects					
Entrainment	22	9	22.280	39	1.00

Table B.3.8. Goodness of fit of Model 2.4.
Observed values (Obs.) relate to empirical data, while minimum (Min.), mean, and maximum (Max.) relate to simulated networks.

Parameter	Obs.	Min.	Mean	Max.	p-value
Negative S-R gossip					
Arc	23	16	23.530	36	1.00
Reciprocity	3	0	3.460	10	1.00
Transitivity	10.180	0.000	11.078	35.882	0.92
Multiple connectivity	26.670	7.000	28.640	68.610	0.96
Manager (receiver)	12	5	12.830	25	1.00
Manager (sender)	17	8	17.180	30	0.94
Seniority	352	210	353.900	575	0.94
Cooperation partners					
Arc	155	128	153.150	172	0.88
Reciprocity	53	40	52.660	64	1.00
Transitivity	246.622	197.266	243.057	276.769	0.82
Manager (receiver)	70	57	69.550	80	1.00
Manager (sender)	65	53	64.540	78	1.00
Seniority	1802	1577	1794.180	1952	0.96
Cross-layer effects					
Entrainment	21	15	21.690	35	1.00

Table B.3.9. Goodness of fit of Model 3.1.
Observed values (Obs.) relate to empirical data, while minimum (Min.), mean, and maximum (Max.) relate to simulated networks.

Parameter	Obs.	Min.	Mean	Max.	p-value
Positive S-R gossip					
Arc	40	26	40.790	66	1.00
Reciprocity	4	0	3.880	12	1.00
Transitivity	16.700	2.000	16.600	50.600	0.70
Multiple connectivity	69.900	24.800	71.750	177.100	0.92
Manager (receiver)	16	4	15.640	26	1.00
Manager (sender)	18	10	18.270	34	1.00
Seniority	264	171	266.490	442	0.88
Cooperation partners					
Arc	300	275	298.120	318	0.82
Reciprocity	100	89	99.420	114	0.98
Transitivity	490.400	447.400	487.250	522.100	0.80
Manager (receiver)	84	70	83.350	97	0.92
Manager (sender)	64	51	64.230	74	0.92
Seniority	1859	1736	1851.240	1956	0.78
Cross-layer effects					
Exchange	28	12	28.520	45	0.98

Table B.3.10. Goodness of fit of Model 3.2.
Observed values (Obs.) relate to empirical data, while minimum (Min.), mean, and maximum (Max.) relate to simulated networks.

Parameter	Obs.	Min.	Mean	Max.	p-value
Negative S-R gossip					
Arc	61	29	63.400	93	0.94
Reciprocity	12	1	12.400	25	1.00
Transitivity	62.600	5.000	66.100	126.000	0.96
Multiple connectivity	143.300	32.400	152.400	269.000	0.88
Manager (receiver)	29	10	30.200	50	0.90
Manager (sender)	29	10	30.700	52	0.84
Seniority	407	192	422.500	637	0.92
Cooperation partners					
Arc	300	257	300.000	317	0.94
Reciprocity	100	74	99.900	114	0.94
Transitivity	490.400	412.800	490.300	520.000	0.90
Manager (receiver)	84	70	84.100	94	1.00
Manager (sender)	64	54	64.200	76	1.00
Seniority	1859	1628	1860.800	1952	0.90
Cross-layer effects					
Exchange	46	23	47.600	73	0.98

Table B.3.11. Goodness of fit of Model 3.3.
Observed values (Obs.) relate to empirical data, while minimum (Min.), mean, and maximum (Max.) relate to simulated networks.

Parameter	Obs.	Min.	Mean	Max.	p-value
Positive S-R gossip					
Arc	30	17	30.750	52	1.00
Reciprocity	4	0	4.170	13	1.00
Transitivity	17.400	1.000	18.750	56.300	0.96
Multiple connectivity	47.600	10.000	49.600	127.100	0.84
Manager (receiver)	14	4	14.140	27	1.00
Manager (sender)	21	11	21.890	39	1.00
Seniority	430	222	444.580	760	0.94
Cooperation partners					
Arc	155	134	153.640	173	0.98
Reciprocity	53	41	52.330	62	0.94
Transitivity	246.600	210.000	244.140	279.400	0.84
Manager (receiver)	70	59	69.340	80	0.98
Manager (sender)	65	58	64.810	73	1.00
Seniority	1802	1619	1789.740	1989	0.88
Cross-layer effects					
Exchange	28	15	28.890	47	1.00

Table B.3.12. Goodness of fit of Model 3.4.
Observed values (Obs.) relate to empirical data, while minimum (Min.), mean, and maximum (Max.) relate to simulated networks.

Parameter	Obs.	Min.	Mean	Max.	p-value
Negative S-R gossip					
Arc	23	12	23.920	38	0.84
Reciprocity	3	0	3.320	11	1.00
Transitivity	10.200	0.000	12.130	47.500	0.94
Multiple connectivity	26.700	7.000	29.810	73.700	0.96
Manager (receiver)	12	3	12.580	28	0.98
Manager (sender)	17	9	18.540	35	0.86
Seniority	352	168	369.930	670	0.70
Cooperation partners					
Arc	155	130	153.920	173	0.92
Reciprocity	53	39	52.680	66	1.00
Transitivity	246.600	208.000	244.750	279.500	0.94
Manager (receiver)	70	60	70.310	80	1.00
Manager (sender)	65	55	64.540	73	1.00
Seniority	1802	1612	1789.670	1983	0.88
Cross-layer effects					
Exchange	21	11	21.710	37	1.00

Table B.3.13. Goodness of fit of Model 4.1.
Observed values (Obs.) relate to empirical data, while minimum (Min.), mean, and maximum (Max.) relate to simulated networks.

Parameter	Obs.	Min.	Mean	Max.	p-value
Positive S-R gossip					
Arc	40	21	39.300	65	0.96
Reciprocity	4	0	3.700	12	0.96
Transitivity	16.700	0.000	16.700	52.300	0.84
Multiple connectivity	69.900	13.000	68.100	168.500	0.84
Manager (receiver)	16	7	16.200	33	1.00
Manager (sender)	18	6	18.000	32	1.00
Seniority	264	127	260.400	444	0.94
Cooperation partners					
Arc	300	274	299.500	321	0.98
Reciprocity	100	83	99.300	114	1.00
Transitivity	490.400	446.000	489.400	526.600	0.96
Manager (receiver)	84	69	83.100	95	0.88
Manager (sender)	64	52	63.200	74	1.00
Seniority	1859	1726	1853.900	1956	1.00
Cross-layer effects					
Entrainment	25	11	24.500	42	0.98
Exchange	28	11	27.400	46	0.96

Table B.3.14. Goodness of fit of Model 4.2.
Observed values (Obs.) relate to empirical data, while minimum (Min.), mean, and maximum (Max.) relate to simulated networks.

Parameter	Obs.	Min.	Mean	Max.	p-value
Negative S-R gossip					
Arc	61	35	62.800	117	1.00
Reciprocity	12	1	12.200	27	1.00
Transitivity	62.600	9.790	63.900	158.000	0.96
Multiple connectivity	143.300	26.790	147.700	391.000	0.96
Manager (receiver)	29	7	29.600	56	0.98
Manager (sender)	29	7	28.700	52	1.00
Seniority	407	223	416.600	763	1.00
Cooperation partners					
Arc	300	272	299.200	320	1.00
Reciprocity	100	86	99.600	115	1.00
Transitivity	490.400	442.720	489.000	525.000	0.90
Manager (receiver)	84	64	83.800	97	1.00
Manager (sender)	64	49	63.800	78	0.98
Seniority	1859	1696	1856.400	1963	0.92
Cross-layer effects					
Entrainment	43	21	44.200	79	1.00
Exchange	46	21	47.300	90	0.96

Table B.3.15. Goodness of fit of Model 4.3.
Observed values (Obs.) relate to empirical data, while minimum (Min.), mean, and maximum (Max.) relate to simulated networks.

Parameter	Obs.	Min.	Mean	Max.	p-value
Positive S-R gossip					
Arc	30	15	29.290	51	0.88
Reciprocity	4	0	3.680	12	0.84
Transitivity	17.400	0.000	14.900	54.700	0.70
Multiple connectivity	47.600	7.390	44.790	136.000	0.72
Manager (receiver)	14	5	13.290	28	0.90
Manager (sender)	21	8	19.580	37	0.74
Seniority	430	208	416.130	731	0.80
Cooperation partners					
Arc	155	137	156.150	172	0.98
Reciprocity	53	42	52.880	61	1.00
Transitivity	246.600	211.190	248.620	277.900	0.96
Manager (receiver)	70	58	70.150	81	1.00
Manager (sender)	65	54	64.320	74	0.92
Seniority	1802	1599	1803.960	1941	1.00
Cross-layer effects					
Entrainment	22	9	21.530	41	0.84
Exchange	28	14	27.410	47	0.88

Table B.3.16. Goodness of fit of Model 4.4.
Observed values (Obs.) relate to empirical data, while minimum (Min.), mean, and maximum (Max.) relate to simulated networks.

Parameter	Obs.	Min.	Mean	Max.	p-value
Negative S-R gossip					
Arc	23	13	22.420	32	0.84
Reciprocity	3	0	2.810	9	1.00
Transitivity	10.200	0.000	9.030	32.000	0.80
Multiple connectivity	26.700	4.000	24.510	58.500	0.80
Manager (receiver)	12	4	11.400	20	0.90
Manager (sender)	17	8	16.660	25	0.98
Seniority	352	196	336.280	500	0.82
Cooperation partners					
Arc	155	135	154.400	173	1.00
Reciprocity	53	42	52.900	64	1.00
Transitivity	246.600	211.000	245.700	278.800	0.92
Manager (receiver)	70	58	69.930	77	0.92
Manager (sender)	65	55	64.290	77	0.90
Seniority	1802	1586	1796.780	1987	0.98
Cross-layer effects					
Entrainment	21	12	20.460	30	0.88
Exchange	21	12	20.330	30	0.86

Appendix C

Chapter 3

C.1 Sociometric questions

The questionnaire was administered in Hungarian, the mother tongue of all interviewees. In this appendix section, we present all sociometric questions used for the analysis in the original version (**HUN**), as well as in their respective English translation (**ENG**). The complete original version of the questionnaire applied in Hungarian and translated into English is reported in Appendix A.1.

1. **Neutral gossip**

HUN: Melyik kollégáitól KAPOTT személyes információt egy harmadik kollégájukról az elmúlt három hónapban?

- **ENG**: Which of your coworkers has GIVEN YOU personal information of another coworker in the past three months?

HUN: Kiről?

- **ENG**: About whom?

HUN: Milyen tartalmú információt? (pozitív; negatív; semleges)

- **ENG**: What kind of information? (positive; negative; neutral)

2. **Personal conversations regularly**

HUN: Kérjük, jelölje meg, hogy az elmúlt három hónapban milyen gyakran folytatott SZEMÉLYES BESZÉLGETÉST kollégájával? Jelölje a megfelelő oszlopot!(1) Hetente többször; (2) Nyolc, vagy több alkalommal hetente.

- **ENG**: Please indicate how often you conducted PERSONAL CONVERSATIONS with your coworkers in the past 3 months by marking the corresponding column. (1) Several times a week; (2) On eight or more times a week.

3. Friendship

HUN: Kérjük, mondja meg, hogy mennyire kedveli kollégáit! Jelölje meg a megfelelő oszlopot! (1) Kedvelem; (2) Jó barátom.

- **ENG**: Please tell us how much you like or dislike your coworkers by marking the corresponding column. (1) I like him/her; (2) He/she is a good friend of mine.

4. Trustworthiness

HUN: Az oszlopokban állításokat olvashat, a sorok a kollégái nevét tartalmazzák. Kérjük, jelölje meg azokat a cellákat, melyek tartalmát igaznak véli. (1) Meg lehet bízni benne.

- **ENG**: The rows below contain statements, while the columns contain the names of your coworkers. Please mark the cells whose content you claim to be true. (1) He/she is trustworthy.

5. Appreciation

HUN: Az oszlopokban állításokat olvashat, a sorok a kollégái nevét tartalmazzák. Kérjük, jelölje meg azokat a cellákat, melyek tartalmát igaznak véli. (2) Ezt a személyt nagyra értékelem.

- **ENG**: The rows below contain statements, while the columns contain the names of your coworkers. Please mark the cells whose content you claim to be true. (2) I appreciate this person.

6. I listen him/her

HUN: Az oszlopokban állításokat olvashat, a sorok a kollégái nevét tartalmazzák. Kérjük, jelölje meg azokat a cellákat, melyek tartalmát igaznak véli. (3) Hallgatok a szavára.

- **ENG**: The rows below contain statements, while the columns contain the names of your coworkers. Please mark the cells whose content you claim to be true. (3) I listen to him/her.

C.2 Clustering of multiplex networks

Table C.2.1. Affective dimensions' networks descriptive statistics

	Friendship	Trustworthiness	Conversations	Appreciation	Listen
Ties	299	111	162	78	164
Density	0.542	0.201	0.293	0.141	0.297
Mean In-/Out-degree	12.458	4.625	6.750	3.250	6.833
Std. dev. In-degree	3.923	2.281	2.345	3.417	3.422
Std. dev. Out-degree	5.013	3.716	4.665	2.893	5.490
In-degree centralization	0.342	0.244	0.238	0.488	0.461
Out-degree centralization	0.388	0.38	0.465	0.306	0.733
Reciprocated pairs	103	12	48	12	18
Transitive Triads (030T)	72	73	32	20	222

Table C.2.2. Jaccard index (Unit A – Public administration sector, 24 workers)

	Friendship	Trustworthiness	Conversations	Appreciation	Listen
Friendship	0.000				
Trustworthiness	0.310	0.000			
Conversations	0.482	0.288	0.000		
Appreciation	0.261	0.331	0.304	0.000	
Listen	0.370	0.244	0.336	0.110	0.000

Table C.2.3. Jaccard index (Unit B – Web development, 19 workers)

	Friendship	Trustworthiness	Conversations	Appreciation	Listen
Friendship	0.000				
Trustworthiness	0.548	0.000			
Conversations	0.496	0.370	0.000		
Appreciation	0.446	0.532	0.242	0.000	
Listen	0.515	0.496	0.322	0.431	0.000

Table C.2.4. Jaccard index (Unit D – Software development, 18 workers)

	Friendship	Trustworthiness	Conversations	Appreciation	Listen
Friendship	0.000				
Trustworthiness	0.594	0.000			
Conversations	0.374	0.350	0.000		
Appreciation	0.461	0.478	0.324	0.000	
Listen	0.431	0.467	0.294	0.459	0.000

Table C.2.5. Jaccard index (Unit E – Software development, 16 workers)

	Friendship	Trustworthiness	Conversations	Appreciation	Listen
Friendship	0.000				
Trustworthiness	0.564	0.000			
Conversations	0.549	0.472	0.000		
Appreciation	0.387	0.352	0.272	0.000	
Listen	0.423	0.408	0.373	0.264	0.000

Table C.2.6. Kendall's W coefficient of concordance

Regular personal conversations	0.700
Appreciation	0.675
Trustworthiness	0.550
Listen	0.475
Friendship	0.400

Table C.2.7. Jaccard index (min. values across units)

	Friendship	Trustworthiness	Conversations	Appreciation	Listen
Friendship	0.000				
Trustworthiness	0.310	0.000			
Conversations	0.374	0.288	0.000		
Appreciation	0.261	0.331	0.242	0.000	
Listen	0.370	0.244	0.294	0.110	0.000

Table C.2.8. Jaccard index (max. values across units)

	Friendship	Trustworthiness	Conversations	Appreciation	Listen
Friendship	0.000				
Trustworthiness	0.594	0.000			
Conversations	0.549	0.472	0.000		
Appreciation	0.461	0.532	0.324	0.000	
Listen	0.515	0.496	0.373	0.459	0.000

Table C.2.9. Jaccard index (mean values across units)

	Friendship	Trustworthiness	Conversations	Appreciation	Listen
Friendship	0.000				
Trustworthiness	0.504	0.000			
Conversations	0.475	0.370	0.000		
Appreciation	0.389	0.423	0.286	0.000	
Listen	0.435	0.404	0.331	0.316	0.000

Table C.2.10. Jaccard index (distances)

	Friendship	Trustworthiness	Conversations	Appreciation	Listen
Friendship	0.000				
Trustworthiness	0.496	0.000			
Conversations	0.525	0.630	0.000		
Appreciation	0.611	0.577	0.714	0.000	
Listen	0.565	0.596	0.669	0.684	0.000

Table C.2.11. Composite networks densities by unit

	Unit A	Unit B	Unit D	Unit E	Mean
Threshold 1	0.643	0.848	0.739	0.704	0.733
Threshold 2	0.422	0.716	0.572	0.579	0.572
Threshold 3	0.275	0.523	0.382	0.442	0.406
Threshold 4	0.107	0.330	0.242	0.208	0.222
Threshold 5	0.027	0.079	0.092	0.058	0.064

C.3 ERGMs goodness of fit

Table C.3.1. Goodness of fit of Model 1
Observed values (Obs.) relate to empirical data, while minimum (Min.), mean, and maximum (Max.) relate to simulated networks.

Parameter	Obs.	Min.	Mean	Max.	p-value
Neutral gossip					
Arc	66	28	68.17	111	0.90
Reciprocity	9	2	9.47	18	1.00
Path closure (gwesp 0.4)	57.51	7.00	59.77	122.03	0.86
Seniority	450	179	466.06	748	0.88
Manager (sender)	30	11	31.31	50	0.96
Manager (receiver)	27	12	27.77	42	0.90

Table C.3.2. Goodness of fit of Model 2
Observed values (Obs.) relate to empirical data, while minimum (Min.), mean, and maximum (Max.) relate to simulated networks.

Parameter	Obs.	Min.	Mean	Max.	p-value
Neutral gossip					
Arc	66	13	65.87	99	0.96
Reciprocity	9	0	9.30	19	1.00
Path closure (gwesp 0.4)	57.51	0.00	57.10	103.37	0.96
Seniority	450	85	451.09	645	0.96
Manager (sender)	30	6	29.93	51	1.00
Manager (receiver)	27	5	27.22	44	0.94
Affective relationships					
Arc	152	113	152.01	182	1.00
Reciprocity	33	22	33.35	48	0.96
Path closure (gwesp 0.4)	183.80	115.13	184.01	245.56	0.94
Seniority	892	667	895.65	1067	0.98
Manager (sender)	33	14	32.61	50	1.00
Manager (receiver)	44	28	43.65	60	0.98
Cross-layer effects					
Entrainment	32	5	31.86	51	1.00

Table C.3.3. Goodness of fit of Model 3
Observed values (Obs.) relate to empirical data, while minimum (Min.), mean, and maximum (Max.) relate to simulated networks.

Parameter	Obs.	Min.	Mean	Max.	p-value
Neutral gossip					
Arc	66	38	67.39	107	1.00
Reciprocity	9	3	9.29	19	1.00
Path closure (gwesp 0.4)	57.51	23.95	58.53	119.67	1.00
Seniority	450	268	461.75	704	0.90
Manager (sender)	30	17	30.84	54	0.96
Manager (receiver)	27	14	27.66	42	0.94
Affective relationships					
Arc	152	119	154.07	188	0.84
Reciprocity	33	20	33.66	49	0.96
Path closure (gwesp 0.4)	183.80	119.29	187.44	244.07	0.86
Seniority	892	695	905.92	1115	0.84
Manager (sender)	33	4	34.06	57	0.94
Manager (receiver)	44	27	45.19	66	1.00
Cross-layer effects					
Exchange	32	15	32.85	58	0.92

Table C.3.4. Goodness of fit of Model 4
Observed values (Obs.) relate to empirical data, while minimum (Min.), mean, and maximum (Max.) relate to simulated networks.

Parameter	Obs.	Min.	Mean	Max.	p-value
Neutral gossip					
Arc	66	21	64.30	107	0.96
Reciprocity	9	1	8.68	18	1.00
Path closure (gwesp 0.4)	57.51	3.00	55.15	122.58	0.90
Seniority	450	140	439.86	736	1.00
Manager (sender)	30	7	28.91	47	1.00
Manager (receiver)	27	6	26.54	42	1.00
Affective relationships					
Arc	152	95	149.51	205	0.98
Reciprocity	33	17	32.16	53	0.92
Path closure (gwesp 0.4)	183.80	82.78	179.35	284.01	0.94
Seniority	892	526	875.59	1184	0.96
Manager (sender)	33	13	33.07	53	1.00
Manager (receiver)	44	19	43.83	66	1.00
Cross-layer effects					
Entrainment	32	5	30.85	55	1.00
Exchange	32	6	31.43	59	1.00

Appendix D

Chapter 4

D.1 Sociometric questions

The questionnaire was administered in Hungarian, the mother tongue of all interviewees. In this appendix section, we present all sociometric questions used for the analysis in the original version (**HUN**), as well as in their respective English translation (**ENG**). The complete original version of the questionnaire applied in Hungarian and translated into English is reported in Appendix A.1.

1. Negative gossip

HUN: Melyik kollégáitól KAPOTT személyes információt egy harmadik kollégájukról az elmúlt három hónapban?

- **ENG**: Which of your coworkers has GIVEN YOU personal information of another coworker in the past three months?

HUN: Kiről?

- **ENG**: About whom?

HUN: Milyen tartalmú információt? (pozitív; negatív; semleges)

- **ENG**: What kind of information? (positive; negative; neutral)

2. Collaboration

HUN: Munkaköri feladataiból adódóan kivel kell együttműködnie?

- **ENG**: Who do you have to cooperate with, due to your job duties?

3. Friendship

HUN: Kérjük, mondja meg, hogy mennyire kedveli kollégáit! Jelölje meg a megfelelő oszlopot! (1) Kedvelem; (2) Jó barátom.

- **ENG**: Please tell us how much you like or dislike your coworkers by marking the corresponding column. (1) I like him/her; (2) He/she is a good friend of mine.

D.2 ERGMs goodness of fit

Table D.2.1. Goodness of fit of Model 1
Observed values (Obs.) relate to empirical data, while minimum (Min.), mean, and maximum (Max.) relate to simulated networks.

Parameter	Obs.	Min.	Mean	Max.	p-value
Structural effects					
Arc	92	52	90.00	126	0.94
Reciprocity	23	8	22.40	36	1.00
Popularity (in-degree)	26.20	19.50	26.10	30.10	0.92
Activity (out-degree)	21.30	15.00	21.20	26.80	1.00
Path-closure (transitivity)	98.00	29.70	94.90	149.20	0.90
Actor-relation effects					
Position (1 = Manager)					
Ego	34	17	33.10	48	0.94
Alter	35	17	33.80	47	0.82
Similarity	51	27	50.50	75	0.94
Seniority (in years)					
Ego	313	176	307.80	422	0.88
Alter	303	179	297.00	412	0.94
Similarity	112	51	109.20	148	0.86
Covariate network effects					
Entrainment					
Collaboration network	62	27	60.00	79	0.86

Table D.2.2. Goodness of fit of Model 2
Observed values (Obs.) relate to empirical data, while minimum (Min.), mean, and maximum (Max.) relate to simulated networks.

Parameter	Obs.	Min.	Mean	Max.	p-value
Structural effects					
Arc	92	46	87.90	131	0.88
Reciprocity	23	7	21.90	36	0.92
Popularity (in-degree)	26.20	17.30	25.80	30.50	0.96
Activity (out-degree)	21.30	13.70	21.10	28.50	1.00
Path-closure (transitivity)	98.00	32.20	91.00	154.90	0.76
Actor-relation effects					
Position (1 = Manager)					
Ego	34	20	33.50	46	0.98
Alter	35	16	33.90	50	1.00
Similarity	51	21	47.80	76	0.96
Seniority (in years)					
Ego	313	165	299.50	429	0.92
Alter	303	160	290.90	419	0.86
Similarity	112	53	108.90	156	0.88
Covariate network effects					
Entrainment					
Friendship network	42	20	40.20	64	0.90

Table D.2.3. Goodness of fit of Model 3
Observed values (Obs.) relate to empirical data, while minimum (Min.), mean, and maximum (Max.) relate to simulated networks.

Parameter	Obs.	Min.	Mean	Max.	p-value
Structural effects					
Arc	92	65	92.20	136	1.00
Reciprocity	23	10	23.40	42	1.00
Popularity (in-degree)	26.20	21.00	26.40	30.60	0.98
Activity (out-degree)	21.30	16.40	21.50	26.90	1.00
Path-closure (transitivity)	98.00	39.30	96.50	171.30	0.90
Actor-relation effects					
Position (1 = Manager)					
Ego	34	22	34.70	47	0.94
Alter	35	24	35.20	53	1.00
Similarity	51	33	50.90	80	0.92
Seniority (in years)					
Ego	313	212	313.10	439	1.00
Alter	303	217	303.00	437	0.98
Similarity	112	71	111.70	156	0.92
Covariate network effects					
Entrainment					
Collaboration network	62	44	61.80	83	1.00
Friendship network	42	20	41.80	61	1.00