DYNAMICS OF INTRA-ORGANIZATIONAL NETWORKS
Four case studies on social selection and influence

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door

Maurits Christiaan de Klepper

geboren te Zeven, Duitsland
promotoren: prof.dr. T.A.B. Snijders
            prof.dr. P. Groenewegen
copromotor: dr. G.G. van de Bunt
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CHAPTER 1

INTRODUCTION

1.1 Introduction
The field of organizational behavior has historically focused on the behaviors of individuals and groups which are central within the context of organizations (Heath & Sitkin, 2001; Mowday & Sutton, 1991; O'Reilly, 1991). But since much of the field has relied heavily on individual characteristics such as motives and needs to explain behavior, it has moved away from a more contextual focus on organizational behavior (O'Reilly, 1991). However, the simple observation that organization members do not think, feel or act in a personal vacuum points us to the fact that organizational behavior cannot be understood without taking into consideration the organizational context, i.e. all stimuli and phenomena that surround and thus exist in the organizational environment external to the individual (Mowday & Sutton, 1993).

The formal structure and physical surroundings of organizations are important contextual stimuli, but the most prominent and direct contextual stimuli an individual experiences stem from his or her position in the social environment of contact with other individuals, i.e. social networks (Heath & Sitkin, 2001; Salancik & Pfeffer, 1978a). Moreover these social networks are also highly contextualized, because what flows across contacts between individuals (e.g. advice) is largely dependent on the organization (Homans, 1950; Lincoln & Miller, 1979). Also, the formation of networks is determined by the formal structure and physical surroundings of organizations (Shrader, Lincoln, & Hoffman, 1989).

This awareness that individual behavior in organizations is heavily influenced by social networks has spawned a relatively new field of intra-organizational social network research. Intra-organizational social network research aims to explain the behaviors and attitudes of individuals or groups of individuals within organizations using social networks as a theoretical lens (Kilduff & Brass, 2010). The central idea of this approach is that individuals are connected through relations, and that this constellation of relations creates a network in which individuals are embedded. This embeddedness provides individuals with both opportunities and constraints which consequently influence their behaviors and attitudes. This
influence of networks comes generally in two forms, either structural or relational (Borgatti & Foster, 2003). Network structural influence is based on individuals’ positions within the overall structure of a network, while relational influence is based on the content, or what flows across relations. The difference between these two types of network influence is best exemplified by social contagion situations. Social contagion occurs when two individuals will have similar behavior (e.g. adopt the same innovation like a new computer program) within a certain social context. A network structuralist explanation of this similarity would be that individual are similar because they occupy similar positions in the network, even if there is no tie connecting them (e.g. Burt, 1987). A relational network explanation is that individuals are similar because there is a direct tie between them, which transmits information or feelings that influences them (e.g. Krackhardt & Kilduff, 2002). But not all network explanations are either structural or relational, Burt’s Structural Hole Theory (1992) for instance, combines both (Borgatti & Foster, 2003), because it explains individual behavior based on a person’s position in the networks as well as how he or she controls the flow (or content) of information. In sum, the main distinction between intra-organizational social network research and more general organizational behavior research is that network research for the most part abandons motivational or attitudinal arguments for explaining individual behavior, and focuses primarily on relational and structural arguments (Kilduff & Brass, 2010).

The last decade intra-organizational social network research has become a scientific field of its own right, and gained legitimacy in the organizational behavior field. The reason that organizational network research has gained legitimacy in this field is that it has been shown that individuals’ network positions and relationships influence a variety of individual outcomes which are central to organizational behavior research (Borgatti & Foster, 2003). Examples of these outcomes are absenteeism, job performance and job satisfaction (Brass, Galaskiewicz, Greve, & Tsai, 2004; Flap, Bulder, & Völker, 1998). Furthermore, as organizational network research has become a separate field, other subject areas – other than classical organization behavior topics – have emerged (Borgatti & Foster, 2003; Kilduff & Brass, 2010). As mentioned above, the network is the social context that influences individual behavior, but an important characteristic of a network is that it is not fully external to the individuals that are part of it. Namely, individuals control their own relationships and thereby can influence the social network structure. Consequently, many researchers also focused on the question of how individuals form relationships in organizational settings (Doreian & Stokman, 1996, 2003; Stokman & Doreian, 2001).
Taking stock of the organizational network research Brass et al. (2004) conclude that the rapid progress of the last decades has offered a rich set of findings both on the causes as well as the consequences of networks. But some issues still remain open for future research. One important issue that keeps recurring in review-studies is that of network change (Borgatti & Foster, 2003; Brass et al., 2004; Kilduff & Brass, 2010; Moliterno & Mahony, 2011). Networks change continuously over time because individuals forge, dissolve and maintain relations within the network. The fact that networks change over time, makes it unreasonable to assume that cross-sectional network research\(^1\) shows the whole picture of network processes. Thus, longitudinal research is needed, because whenever more periods are taken into account the element of choice and decay of various network relations may reveal the underlying explanatory mechanisms to a larger extent than cross-sectional data would reveal (Burt, 2001; Doreian & Stokman, 1997; Snijders, 1995; Snijders, van de Bunt, & Steglich, 2010; Weesie & Flap, 1990).

This dissertation delves in this central issue of network change by using panel data on social networks collected within organizational settings. Thus, the *dynamics of intra-organizational networks is the central theme* of this dissertation and it is where its primary contribution lies. How studying networks longitudinally contributes to a better understanding of network processes, will be explained below.

### 1.2 General framework and chapter descriptions
This dissertation consists of four studies within the field of intra-organizational social network research, three of them being longitudinal. Each chapter deals with a separate question that longitudinal research can help to answer.

Chapter 2 deals with the theoretical issue of network selection, which focuses on the following question: *how do individuals create, break or maintain ties with others?* Cross-sectional analysis would provide only a ‘snapshot’ of these network selection mechanisms, which leaves the possibility that findings are an idiosyncrasy of that moment, instead of a theoretical regularity. Longitudinal analysis on the other hand would be able to capture the change process over time and thereby also the theoretical regularity across *multiple* ‘snapshots’ (Tuma & Hannan, 1984).

Another issue that longitudinal research can help to solve is that of ambiguous causal relationships. Above we described that social networks are *either* consequences or

\(^{1}\) Most network studies are cross-sectional
antecedents, but several studies in social network research propose a mutual feedback process of both causal effects of network, in which networks are interchangeably antecedents as well as consequences (Nohria, 1992; Steglich, Snijders, & Pearson, 2010). For instance, an individual’s performance is determined by his or her central position in the social network at work (i.e. network is a cause), but the performance can also strengthen the centrality of that person in the same network (i.e. network is a consequence) (Sparrowe, Liden, Wayne, & Kraimer, 2001). It is very likely that networks function both as causes and consequences, i.e. networks and performance mutually reinforce one another. One can only determine the relative importance of either causal effect by looking at them simultaneously using a longitudinal design (Snijders, Steglich, & Schweinberger, 2007; Steglich et al., 2010). In chapter 3 and 4 we aim to integrate both directions of causality. The main questions here is: How do the two causal relationships between networks and outcomes relate to one another? In other words, when do individuals’ relationships and network positions determine individuals’ attitudes and behaviors, and when do these individuals’ attitudes and behaviors determine individuals’ relationships and network positions?

The last chapter, Chapter 5, does not directly fall into the theme of the dynamics of intra-organizational networks, but it certainly contributes to the overall field of intra-organizations network research. The similarity between Chapter 5 and other chapters is that this chapter also has a comparative character. In the first three chapters there is a comparison of effects through time, while the last chapter investigates effects of networks across multiple cases. By comparing multiple cases we are able to determine theoretical regularities across different organizational settings.

Above we explained broadly how each chapter is positioned in the central theme of intra-organizational networks and social network dynamics. Below we will elaborate on each chapter in more detail, which also leads to more theoretically specific descriptions. By this, I mean that each chapter focuses on distinct intra-organizational issues, and each chapter is framed in such a way that this issue is central to it.

1.2.1 Chapter 2: A longitudinal analysis of multiple information networks in a medical professional organization

In this chapter we take a social networks perspective on individual knowledge sharing in organizations. We investigate how advice networks are structured between individuals within an organization (Borgatti & Cross, 2003; Cross, Borgatti, & Parker, 2001; Nebus, 2006). We
argue that this is relevant as it has been shown that the way individuals seek out other colleagues for the retrieval of information is paramount to understanding organizational as well as individual performance (Argote, McEvily, & Reagans, 2003). The main question of this chapter is: to whom do individuals go to for information within a professional work setting over time, and what types of information do they acquire from these other individuals?

The setting of our study is a department of a regional Dutch hospital specialized in physical and psychological rehabilitation of patients after surgery or trauma. It is a common understanding that within such contexts, professionals need to acquire knowledge from others to accomplish their tasks effectively (Carlile, 2002; Cross & Sproull, 2004; Shrader et al., 1989; Van de Ven, Delbecq, & Koenig, 1976). Since, information seeking and sharing is salient and central to this organization, this setting is highly suitable for our research question.

1.2.2 Chapter 3: Individual status and informal peer control in a military organization

In the last thirty years, many professional organizations have switched from bureaucratic and hierarchical organizational structures to ‘flat’ organizational structures (Scott, 2003). The shift of organizational structure has been accompanied by a change from formal control to informal control or peer-to-peer monitoring and sanctioning (Barker, 1993; Tompkins & Cheney, 1985). In order to understand this shift, researchers have shown that this informal control follows – or is determined by – the existing informal hierarchy with an organization (e.g. Lazega & Krackhardt, 2000), but it also has been argued that informal control is used to change and uphold the same informal hierarchy (e.g. Kipnis, Schmidt, & Wilkinson, 1980). In other words, informal control and informal hierarchy mutually influence one another over time. This is the main issue that this chapter aims to tackle, by addressing the following specific questions: 1. how does an individual’s position in the group’s informal status hierarchy determine to what degree an individual controls others, or is targeted by others? 2. How does the degree to which an individual controls others, or is targeted by others, affect the individual’s status within the group over time? We will argue that both these causal effects are mutually reinforcing over time.

The setting for this study – the Royal Netherlands Naval College (in Dutch abbreviated as KIM) – is a military organization with no formalized group structure, so all structure emerges informally from the interactions among its members – the group of freshmen at the heart of our study. Using a longitudinal research design we examine how peer control and the informal status hierarchy of the organization co-evolve over a twelve month period.
1.2.3 Chapter 4: Similarity in friendship networks: selection or influence? The effect of constraining contexts and non-visible individual attributes

A well-established finding in social sciences is that people who are friends exhibit a great deal of similarity in attitudes and behaviors (McPherson, Smith-Lovin, & Cook, 2001). Generally, it is understood that similarities among friends are a result of two different causal mechanisms: social selection and social influence processes (Cohen, 1977; Kandel, 1978). That is, befriended individuals are similar because they develop relationships with similar others (i.e. social selection), but also because they become similar through their relationships with others (i.e. social influence). In many cases both causal mechanisms are equally plausible, but in this chapter our main contributions is that we will show that certain contingencies circumscribe when either of the two mechanisms of selection and influence are more plausible. Primarily, we argue that in a context with stronger organizational constraints – i.e. where individuals are expected to work together to fulfill the requirements of their job – influence will be a stronger predictor of similarities between friends than selection. Thus, our study attempts not just to understand the processes that cause similarities among friends, but also to determine which contextual conditions make either selection or influence more likely to be the main underlying mechanism.

The context we examine is the friendship network among a cohort of students at the Royal Netherlands Naval College (in Dutch abbreviated as KIM). We focus on similarity among befriended student officers with respect to compliance with rules and the acceptance of orders and authority, referred to as (military) discipline (Shalit, 1988: 122-123). The KIM-setting suits our purpose because both friendship networks and discipline are developed within the military socialization program at the KIM, and are therefore subject to strong organizational constraints. Furthermore, the socialization program at the KIM specifically aims to homogenize officer students to fit the organizational norms and rules, of which discipline is a salient one (Van de Aker, 2005).

1.2.4 Chapter 5: Specifying cohesion and structural equivalence as bases of social influence on time stress

A central question among network studies that explain social homogeneity is: are actors similar because they have direct relationships (i.e. as a result of cohesion), or, because they have similar structural positions within the social network (i.e. as a result of structural equivalence)? Most studies that answered this question did so by empirically comparing the predictive power of both cohesion and structural equivalence (Marsden & Podolny, 1990) or
by using differentiating operationalizations of cohesion and equivalence (Borgatti & Everett, 1992). Rather remarkably, only a few studies have tried to answer the question by looking at the theoretical distinctions between cohesion and equivalence (Burt, 2010; Kilduff & Oh, 2006). Thus, the purpose of this study is to investigate how structural equivalence and cohesion can be better discriminated, both theoretically and empirically. The key argument is that the distinction between structural equivalence and cohesion is not an issue of right or wrong, but rather how or through which theoretical mechanism.

For this study we used cross-sectional data on four organizations: a management team of a German paper factory; a care unit of a dialysis department of a large city regional Dutch hospital; a project team of a multinational computer corporation; and, a housing corporation in the northern part of the Netherlands (Van de Bunt, 1999; Wittek, 1999). In these settings, we chose time stress as the dependent variable suited to be the object of social homogeneity.

As noted earlier, each chapter has its own contribution to a subfield of organization science, yet all share the intra-organizational network lens. Moreover, the chapters also share a great deal of similarity in their research design as well as method of analysis. We elaborate on this below.

1.3 Research design and methods

In this dissertation multiple case-studies (six organizations in total) were executed to answer the questions we pose above. For all cases, the data were acquired by administering a questionnaire in which we included full-roster questions for the collection of network data. With a full-roster question all respondents are presented with a full list of all other respondents within the same group the questionnaire is administered to (Wasserman & Faust, 1994). To determine the boundaries of the group, and therefore network, we followed the natural formal boundaries (e.g. department, locations) of the organizations under investigation. This type of network demarcation is referred to as the nominalist approach (Laumann, Marsden, & Prensky, 1983). We collected data on complete networks, which means that all networks relations are within the group under investigation – no ties external to the bounded group are taken into consideration. This also implies that the observations are non-independent, a well-known characteristic of network data (Wasserman & Faust, 1994). Because of the selectiveness and non-independence of our data, and its longitudinal design we used a specialized method of analysis for most of our chapters. The method that is most suitable for this purpose is the so-called actor-based model for network dynamics (Snijders et
Another important strength of the actor-based model, a strength we need for chapters 3 and 4, is that it allows to disentangle the two causal effects of network selection and influence (Steglich et al., 2010). Actor-based models are not the only method for the analysis of the type of data we have at hand. However, the current alternative available models (e.g. structural equation models) for estimating dual causality have three shortcomings. Firstly, network data is often treated as an individual-level attribute, which ignores the endogenous network effects, such as reciprocity and group closure. Secondly, the current models violate the statistical assumption of independence of cases by ignoring that relationships are inherently interdependent. Finally, since panel data are collected at discrete time points, there is the problem of unobserved ‘to-and-fro’ changes between measurements. The actor-based model overcomes all these problems; it does not assume statistical independence of cases, it can incorporate endogenous network effects, and it allows for unobserved changes at random moments as time progresses between two observed time moments. For a full technical and mathematical account we refer to Snijders et al. (Snijders et al., 2007).