Status Differentiation

New Insights from Agent-Based Modeling and Social Network Analysis

André Grow

ICS
RUG / UU / RU

Status Differentiation

New Insights from Agent-Based Modeling and Social Network Analysis

ISBN (print): 978-90-367-8481-8
ISBN (digital): 978-90-367-8480-1
Printing: Ridderprint BV, Ridderkerk, the Netherlands

university of groningen

Status Differentiation

New Insights from Agent-Based Modeling and Social Network Analysis

PhD thesis

to obtain the degree of PhD at the
University of Groningen
on the authority of the
Rector Magnificus Prof. E. Sterken
and in accordance with
the decision by the College of Deans.

This thesis will be defended in public on

Monday 11 January 2016 at 16.15 hours

by

André Grow

born on 27 January 1983
in Düsseldorf, Germany

Supervisors
Prof. R.P.M. Wittek
Prof. A. Flache

Assessment Committee
Prof. V.W. Buskens
Prof. C.L. Ridgeway
Prof. T.A.B. Snijders

Table of Contents

Chapter 1

Introduction

1.1 Introduction

Understanding how status differentiation comes about is a core task of sociology since the beginnings of the discipline (Jasso, 2001; Ridgeway, 2014). One reason "is the near-universality of the phenomenon: across a wide range of scales and contexts, actors are sorted into social positions that carry unequal rewards, obligations, and expectations" (Gould, 2002, p. 1143). A second reason is that status differentiation can have far-reaching consequences for those concerned by it. High status individuals tend to be more influential and receive more attention (Berger, Fisek, Norman, & Zelditch, 1977; Berger, Rosenholtz, & Zelditch, 1980), fare better in the educational system and have better chances on the labor market (Foschi, Lai, & Sigerson, 1994; Moss-Racusin, Dovidio, Brescoll, Graham, & Handelsman, 2012; Schmader, 2002; Steele & Aronson, 1995), are often in better health and report higher subjective well-being (Anderson, Kraus, Galinsky, & Keltner, 2012; Fournier, 2009; Ghaed & Gallo, 2007; Gruenewald, Kemeny, & Aziz, 2006; Huo, Binning, & Molina, 2010; Tay & Diener, 2011), and have higher life expectancy (Marmot, 2004) than lower status individuals. Status differentiation is thus considered a major source of social inequality that affects virtually all aspects of individuals' lives (Ridgeway, 2014).

As Ridgeway and Correll highlighted, "status can be understood as an evaluative ranking between social groups in which one group (e.g., professionals) is held in the culture to be more socially significant and worthy of respect than is another (laborers). Yet status can also be seen as an evaluative hierarchy among individuals in which one person is more respected, deferred to and influential than another" (Ridgeway & Correll, 2006, p. 431). In the present dissertation, I aim to contribute to the understanding of the processes that lead to status differentiation at both levels. Specifically, in Part 1 (Chapters 2 and 3), I focus on the processes that can lead to the emergence of status differentiation between social groups. In Part 2 (Chapters 4 and 5), I focus on the processes that can lead to the emergence of status differentiation between individuals. As I will discuss below, the processes that lead to status differentiation at the two levels are inherently intertwined (Ridgeway & Correll, 2006). That is, understanding how status differentiation emerges between social groups requires an understanding of how status differentiation emerges between individuals, and vice versa. Both issues therefore feature in all chapters of this dissertation, with varying emphasis.

How do sociologists explain the emergence of status differentiation between individuals and social groups? For example, how do they explain that in many social settings status hierarchies emerge in which some individuals are more respected than others (Bales, 1950, 1970; Goode, 1979; Gould, 2002)? And how do they explain that in many Western societies men are assumed to be more worthy than women (J. W. Balkwell & Berger, 1996; Brashears, 2008; Hopcroft, 2002; Moss-Racusin et al., 2012; Ridgeway, 2011), that whites are seen as

more competent than blacks (E. G. Cohen, 1982; Steele & Aronson, 1995), and that the middle aged are often more respected than the old (Ishii-Kuntz & Lee, 1987)?

Traditionally, sociologists have assumed that individuals obtain status either through the possession of valuable resources or power, that enable them to engage in acts of social exchange and dominance (cf. Anderson & Kilduff, 2009; Cheng, Tracy, Foulsham, Kingstone, & Heinrich, 2013; Ridgeway, 1987). From an exchange perspective, actors who possess valuable resources desired by others can use these resources as a currency in exchange for respect and deference (Blau, 1964; Flynn, Reagans, Amanatullah, & Ames, 2006; Flynn, 2003; Goode, 1979). From a dominance perspective, individuals who are more powerful than others can use this advantage to extort gestures of respect and deference from those who are less powerful (cf. Cheng et al., 2013). Applied to the group level, these explanations hold that status differentiation is the result of factors that lead to systematic resource and power differences between the members of different social groups. In the case of gender, for example, it has been argued that certain religious beliefs, inheritance practices, and modes of production tend to create social structures in which resources and power become concentrated among men, thereby leading to differences in the worth and respect attributed to the different sexes (Hendrix & Hossain, 1988; Sanderson, Heckert, & Dubrow, 2005; Stover & Hope, 1984). Similarly, differences in the modes of production and inheritance customs across societies have been assumed to translate into variation in the resources and power that the elderly control. This variation might partly explain why older people have low status in some societies, but high status in other societies (C. Balkwell & Balswick, 1981; Ishii-Kuntz & Lee, 1987).

The foregoing illustrates that traditional explanations locate the causes of status differentiation in factors largely exogenous to the status system. More recent research in the expectation states framework (Berger et al., 1977, 1980; Wagner & Berger, 2002), and in particular in status construction theory (Mark, Smith-Lovin, & Ridgeway, 2009; Ridgeway & Balkwell, 1997; Ridgeway, 1991, 2000), has described alternative processes in which the causes of status differentiation can be endogenous to the status system. These processes do not require any objective resources and power differences between individuals or social groups.

The expectation states framework focuses on interactions in small groups with a collective task focus (e.g., work teams, student learning groups, and neighborhood organizations) as building blocks of society. It holds that such groups can spontaneously develop hierarchies of influence and deference in which some individuals appear more resourceful and worthy of respect than others. Status construction theory, which is part of the expectation states framework, argues that when such differentiation occurs consistently between members of different social categories, even if only by accident, individuals can come to believe that the social distinction generally coincides with differences in resources and social worth. Once emerged, such a belief can diffuse throughout the population, because individuals carry it into new group contexts, treat new interaction partners accordingly, and thereby create hierarchies that teach their belief to others. By that, spontaneous status differentiation between individuals can lead to status differentiation between social groups, even when there are no resource and power differences between the individual members of the different groups.

Research in the expectation states framework and status construction theory has

significantly advanced our understanding of how status differentiation between individuals and social groups might emerge. Despite these advances, there are still significant gaps in our knowledge that I seek to narrow in this dissertation. In Part 1, I focus on the notion that status differentiation between social groups can be completely arbitrary and does not require any initial resource or power differences between the members of the groups involved. My goal is to shed more light on the conditions under which such social construction is likely to occur in small group interaction (Chapter 2) and on the conditions under which the resulting beliefs are likely to spread throughout society (Chapter 3). In Part 2, I focus on the processes that can lead to the emergence of status differentiation between individuals in small group contexts. I highlight that existing research in the expectation states framework has mostly been conducted in the laboratory and has almost exclusively concentrated on groups with a collective task focus. My goal is to show how some of the processes that the expectation states framework describes play out outside the laboratory, in groups with a collective task focus (Chapter 4) and in groups without a collective task focus (Chapter 5).

Taken together, I aim to improve our understanding of the processes that can lead to status differentiation at both the individual and social group level. In this introductory chapter, I first discuss the dynamics by which, according to earlier research, interactions in groups with a collective task focus can lead to status differentiation between individuals and social groups. Then, I discuss the limitations of earlier research on this topic and how I address these in this dissertation.

1.2 Status Differentiation from Task Focused Interaction

The expectation states framework and status construction theory describe behavioral and cognitive processes that can lead to the emergence of status differentiation between individuals and social groups. Research in this area focused on social groups based on categorical distinctions that create at least two mutually exclusive social categories. These should be easy to discern in face-to-face interaction, as is typically the case for characteristics such as gender and race. I follow this tradition and use the terms ‘social groups’ and ‘social categories’ interchangeably. Mostly I use ‘social categories’ to avoid confusion with the term ‘small groups’.

1.2.1 The individual level

The development of the expectation states framework was induced by the observation that small problem solving groups tend to quickly develop inequalities in patterns of participation and influence among their members (Correll & Ridgeway, 2003; Skvoretz, 1988). That is, small group researchers were struck by the fact that experimental decision-making groups tend to quickly develop hierarchical structures in which some group members receive more attention, gain more opportunities to contribute to the collective goal, are more influential, and receive more positive performance evaluations than others (Bales, Strodtbeck, Mills, & Roseborough, 1951; Bales, 1950). Another striking feature was that such differences often are aligned with salient social distinctions, such as gender and race (Strodtbeck, James, & Hawkins, 1957;

Strodtbeck & Mann, 1956). Since these early works, many studies have examined the conditions under which status hierarchies emerge and which factors facilitate or hinder this emergence (for recent reviews see Correll & Ridgeway, 2003; Wagner & Berger, 2002).

Research in the expectation states framework has developed within clear scope conditions. The framework centers on the emergence of status differentiation among previously unacquainted individuals in group settings with a collective task focus (Berger et al., 1977). Collective task focus means that individuals perceive the successful completion of some important task as the primary purpose of their membership in the group and that success can only be accomplished through teamwork. In such a context, the framework holds that individuals behave as if one of their tasks is to determine who is highly skilled in the task, to be able to structure their work effectively and efficiently (Driskell, 1982). That is, in their pursuit of goal achievement, group members somehow need to coordinate their work on the collective task and hierarchical differentiation (in the form of differential performance opportunities and influence) is often instrumental to achieving this goal (cf. Halevy, Chou, & Galinsky, 2011). Yet, the framework does not assume that hierarchies are always beneficial for group performance or that individuals always consciously try to establish hierarchical differentiation. It only assumes that people act 'as if' they try to maximize the chances of success by determining who is potentially able to make valuable contributions to the group's goals and coordinating their input on the task accordingly (Berger et al., 1977).

Thus, at the core of the framework is the assumption that in groups with a collective task focus, inequalities in participation and influence – in short, status – emerge from the need to coordinate collaborative work. Formally, the framework conceptualizes assumptions about relative abilities as *performance expectations* (Berger et al. 1977) that group members hold for each other. Such expectations can be specific or general. They are specific when they apply to a small set of well-specified tasks (e.g., when individuals think 'this person will probably perform well in mechanical tasks'). They are general when not restricted to one situation (i.e. when individuals think 'this person is generally very capable and will probably perform well in many tasks') (Berger et al., 1977). Performance expectations affect the way group members coordinate their work on the task, so that those expected to perform better than others are more likely to receive performance opportunities (e.g., they are more often asked for their opinion) and their task inputs are evaluated better, even if they are similar to the input of members for whom performance expectations are lower (Balkwell 1991a; Berger, Rosenholtz, & Zelditch 1980; Driskell 1982).

How do individuals develop performance expectations of each other, according to the expectation states framework? Three sources, the focus of much of the existing research, are relevant in the context of this dissertation. First, information about task relevant abilities and competence are taken as immediate cues as to which group members are more likely to be able to make valuable contributions to the group's task. In the expectation states framework, individual characteristics linked to specific performance expectations are called *specific status characteristics* (Berger et al., 1977). To illustrate, imagine a group of social science students who have to jointly solve a problem in the area of mathematical sociology for course credit. Imagine further that one of the group members previously obtained a minor in math, before

switching to social science, and imagine that the other group members know this. It is likely that in this situation the group members will expect the individual with the background in math to have relatively high mathematical ability (specific status characteristic), which will lead the group to have high and very specific performance expectations for the math student compared to the rest of the group. Consequently, the group is more likely to listen to and appreciate the suggestions this individual makes for solving the task.

Second, in groups of previously unacquainted individuals, information about each other's abilities and competence is often hard to come by. So people tend to rely on *diffuse status characteristics* (Berger et al., 1977) as a further source of information. A diffuse status characteristic is any social distinction that has at least two states differentially evaluated in society and associated with both specific and diffuse performance expectations (paraphrased from Berger et al., 1980, p. 483). To illustrate this, consider the example of gender. In many Western societies, gender is a diffuse status characteristic, because men are more respected than women (differential evaluation) and because men are often assumed to be generally more able and competent than women (general performance expectation). Additionally, men are often assumed to be better at mathematics, whereas women are often assumed to be better in work with children (specific performance expectations). Consequently, performance expectations are typically higher for men when it comes to mathematics, but also when it comes to tasks not explicitly related to gender. In this dissertation, my focus is on the cognitive and behavioral processes that create and derive from such diffuse status characteristics. For simplicity, from here on I use the term status characteristic to refer to diffuse status characteristics as defined here; I use terms like abilities, skills, and competence to refer to specific status characteristics as defined above.

Third, individuals tend to infer ability and competence differences from behaviors that usually *result* from ability and competence differences. For example, when group member A_1 is very appreciative and accepting of the suggestions of group member A_2, whereas A_2 criticizes and rejects A_1's suggestions, it can appear to observers that A_2 is more competent than A_1 and has better leadership qualities in the specific context than A_1. Therefore, group members will have higher performance expectations for A_2 than for A_1. More formally, in the expectation states framework, interaction patterns assumed to signify ability and competence differences between individual group members are called *behavior interchange patterns* (Fisek, Berger, & Norman, 1991). The information that individuals derive from such patterns can combine with other sources of performance expectations and thereby can lead to a reinforcement of existing status differences between group members (Webster & Rashotte, 2010). For example, when gender is a status characteristic that favors men over women, male individuals are more likely to find their suggestions accepted by women in a given group context. Such acceptance establishes behavior interchange patterns that support the existing belief that men are generally more competent than women. This strengthens the status differences that exist between them in the local group context (Webster & Rashotte, 2010).

Behavior interchange patterns have the potential to generate stable status differentiation, even in the absence of any status characteristics or competence differences among group members. Whenever two persons interact, there is a chance that during their interactions a

behavior interchange pattern becomes established in which one individual appears more able and competent in the task at hand than the other, even if only by coincidence. The resulting shift in performance expectations that benefit this group member makes it more likely that their suggestions will receive more attention and that their contributions will be evaluated positively. This, in turn, leads to a situation in which more behavior interchange patterns become established that further contribute to the impression that they are more capable than others (cf. Lynn, Podolny, & Tao, 2009; Skvoretz & Fararo, 1996).

1.2.2 The social group level

The foregoing illustrates that in the expectation states framework status differentiation at both the individual and social group level are connected by a process of *status generalization* (Webster & Driskell, 1985).[1] In this process, people apply widespread beliefs about differences in the social worth and competence between members of different social categories to specific individuals. Such status generalization can lead to hierarchical differentiation in small, socially heterogeneous groups. Status construction theory holds that this process can also work the other way around. That is, the observation of status differentiation between individuals can lead to generalized beliefs about the social worth and competence of members of different social categories.

The theory builds on the insight that behavior interchange patterns can induce assumptions about the abilities and competence that people possess and argues that individuals tend to apply such assumptions to whole social categories, when the members of one category frequently appear to be more competent than the members of another category. To illustrate this, consider the case of a mixed-gender discussion group and assume initially that gender has no status value. If a group pattern emerges in which men typically accept the suggestions of women and evaluate their input positively, whereas women typically reject the suggestions of men and evaluate their input negatively, observers and group members can come to believe that this differentiation provides information about the respectability and competence that men and women largely possess relative to each other. As a result, individuals acquire *status beliefs* (Ridgeway, 1991) that transform the social distinction into a status characteristic in the eyes of the belief-holders.

Such belief acquisition is most likely to occur when a social distinction is associated with apparent competence differences in a comprehensive and consistent manner (Ridgeway, 2000). Comprehensive means that individuals have observed several behavior interchange patterns between members of two different social categories and consistent means that these patterns generally favor the members of one category over members of the other category (Ridgeway & Correll, 2006; Ridgeway, 2000). Once a status belief emerges in at least some individuals, it has the potential to spread throughout the population, given that it affects the way its holders treat their interaction partners. That is, when individuals have acquired a certain status belief in one context, they tend to carry this belief into other contexts and treat their interaction partners

[1] The theory specifically focusing on status generalization processes in the expectation states framework has been called ‘status characteristics theory’ or ‘status generalization theory’ (Correll & Ridgeway, 2003).

accordingly. This means that in the next group in which they take part, behavior interchange patterns are likely to emerge that reflect the beliefs that they hold. These new behavior interchange patterns teach the beliefs to others which is how they diffuse throughout society (Ridgeway, 1991).

In the initial formulation of the theory, Ridgeway (1991) highlighted the importance of an initial resource difference between the members of at least two different categories for status beliefs to emerge, spread, and become widely consensual in the larger population. This is because such a correlation ensures that in many parts of the population, the members of one category tend to be more respected and take the higher status position in their interactions with members of the other category. Even if the initial correlation is weak, so Ridgeway reasons, the learning and diffusion processes that status construction theory describes should tend to amplify the initially small advantage that members of one category have, thereby leading a corresponding status belief to spread and become widely consensual in the population. The formal modeling work presented by Ridgeway and Balkwel (1997) strongly supports the logical consistency of this argument, but more recently Mark et al. (2009) showed that from a theoretical point of view an initial correlation between a social distinction and resources is not necessary for status beliefs to emerge, spread, and become widely consensual in the larger population.

In developing their argument, Mark et al. (2009) started from the insight that during face-to-face collaborative work status differentiation can emerge spontaneously. If this is the case, and if there is no systematic resource difference between the members of two social categories, behavior interchange patterns that benefit either category should emerge randomly and in equal numbers in the population. That is, in some parts of the population hierarchies will emerge that favor the members of category A, but in other parts of the population, such hierarchies will favor the members of category B. If there were no systematic resource difference between the two, nothing would systematically lead to an advantage for one. Consequently, the emergence and diffusion processes that status construction theory describe should lead to equal numbers of individuals believing that members of either category are more competent than members of the other category. Thus, status beliefs would not become consensual in the population. Yet, as Mark et al. (2009) showed mathematically, the foregoing prediction holds only if the numbers of instances in which the members of the different categories appear in the superior position are perfectly balanced. Any small, random perturbation of this balance is likely to be reinforced by the interaction and diffusion processes that status construction theory describes, so that the corresponding belief will first become dominant in the population and ultimately widely consensual. Mark et al. highlighted that this implies that the processes that status construction theory describe have a strong tendency to create status differentiation between social groups, even in the absence of resource and competence differences between the groups.

1.3 Limitations of Past Research and Research Questions

As the foregoing discussion illustrates, the explanations of status differentiation that the expectation states framework and status construction theory offer are compatible with

traditional explanations offered in sociology, particularly explanations based on the notion of social exchange. That is, the expectation states framework and status construction theory also hold that status differences between individuals and social groups can emerge from resource differences. Yet, compared to earlier research, the expectation states framework and status construction theory add the notion that both individuals and social groups can attain status even in the complete absence of such differences.

Over the last decades, empirical research verified many of the basic assumptions and propositions of the expectation states framework and status construction theory. Similarly, analytical work has illustrated some of the striking implications that the assumptions of the expectation states framework and status construction theory have for the emergence of status differentiation. However, as I argue in this section, there are still important gaps in our knowledge. I discuss these gaps in two parts. In the first, I discuss some analytical work done in status construction theory and argue that it is limited by neglecting complexities that derive from the fact that status construction processes are based on many individuals' interactions occurring simultaneously in different parts of society. In the second part, I discuss some empirical work done in the expectation states framework and argue that the reliance on artificially created laboratory groups and the concentration on groups with a collective task focus limits the generalizability of the insights gained in this area.

1.3.1 Part 1: The complexity of status construction processes

The insight that status construction processes can lead to completely arbitrary status differentiation between social groups provides an important new view on the creation of social inequality. However, I argue that the analytical work that underlies this insight is limited by two important simplifications. The first simplification is the focus on the dyad as the smallest possible group in which status differentiation between members of different social groups can emerge. The second is the assumption that interactions between the members of different social groups occur at random in the population. Both simplifications aimed at reducing complexity and making the processes under consideration analytically tractable. Here I discuss each simplification in turn and formulate corresponding research questions that remain unanswered so far.

1.3.1.1 The focus on the dyad

In their formal modeling work, Mark et al. (2009) focused on the dyad as the smallest possible group in which hierarchical differentiation can occur. This is a useful starting point for examining status construction processes, because it allows us to abstract from some of the complex interaction dynamics that might develop in larger groups. In particular, in dyads any hierarchical differentiation that emerges is fully aligned with any social distinction that might differentiate group members. In larger groups, by contrast, more complex status structures can arise and these structures might provide partially contradicting information about competence differences between the members of different social categories.

To illustrate the complex structures that can arise in larger groups, consider the following. Imagine a group of four individuals differentiated by a nominal social distinction N that has

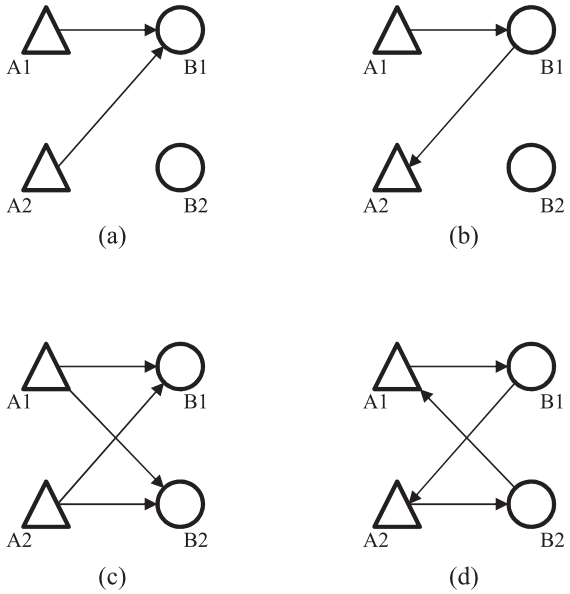

Figure 1.1 Examples of status structures in small groups with a collective task focus that vary in consistency and comprehensiveness. Triangles and circles represent individuals for which $N_i = A$ and $N_i = B$ respectively. A directed tie between two individuals indicates that a behavior interchange pattern has been established, in which the source appears in the higher competence role and the sink appears in the lower competence role. Panel (a): consistent, but not comprehensive structure; panel (b): inconsistent and not comprehensive structure; panel (c): consistent and comprehensive structure; panel (d): inconsistent, but comprehensive structure.

two categories, A and B. In real life, this distinction could represent gender with the categories male/female, or race with the categories white/black. Imagine further that two group members belong to category A and two belong to category B. The four panels in Figure 1.1 illustrate different structures of behavior interchange patterns between the members of the different categories. For simplicity, I only focus on status differentiation between individuals who belong to different social categories and neglect status differentiation between individuals who belong to the same category.

Panels (a) shows a situation in which the two members of category A (i.e. A_1 and A_2) both argued with individual B_1 about how to solve the collective problem and B_1 has, after some disagreement and discussion, accepted their suggestions. Therefore, both A_1 and A_2 appear more competent and more akin to leaders than B_1. In this situation, the existing competence information consistently favors members of category A and this has the potential to induce the belief that members of this category are generally more competent than members of category B. Despite this consistency, the members of the group are not very likely to acquire such a belief yet, given that so far only a part of the possible interactions between the members of the

different categories have taken place. That is, status relevant information is not comprehensive yet. Panel (b) shows a situation that is similarly comprehensive, but that is less consistent given that the status information that it provides is very mixed. During their interactions, B_1 appeared less competent than A_1 but appeared more competent than A_2. This implies that there is no association between competence and differences in the social distinction. Panels (c) and (d) show examples in which the status structures provide very comprehensive information, but in which the level of consistency varies strongly. In panel (c), the observed status information is fully comprehensive and consistently puts members of category A in the higher competence role. By contrast, in panel (d), there is no association between apparent competence differences and differences in the social distinction.

The examples shown in Figure 1.1 illustrate that in groups larger than the dyad different status structures can arise that either support or undermine the formation of status beliefs. The larger groups become, the more complex these structures can get and the longer they take to evolve. By focusing on dyads, Mark et al. (2009) abstracted from such complex structures and the associated cognitive and behavioral principles by which such structures affect face-to-face interaction. It remains hitherto unexplored how likely interactions in groups larger than the dyad are to generate the conditions that make the creation of status beliefs possible and developing hypotheses about this is far from trivial.

Consider, for example, the effect that the emergence of behavior interchange patterns has on subsequent interactions, as described in Section 1.2. Individuals who are involved in behavior interchange patterns in which they appear more competent than their interaction partners, are more likely to be involved in subsequent interactions, and are more likely to convince others of their views. Applied to the example shown in panel (a) of Figure 1.1, this implies that individual B_1 is less likely to be involved in the next task-related interaction that takes place in the group. Even if this individual is involved in the next interaction, the likelihood that he/she can convince other group members of his/her opinion is lower than it was before any behavior interchange patterns had been established. Conversely, A_1 and A_2 are more likely to be involved in the next interaction and their suggestions are more likely to be accepted. Thus, when A_1 or A_2 interact with B_2 it is likely that a new behavior interchange pattern emerges that supports the belief that *As* are generally more able and competent than *Bs*. This example suggests that the effects that behavior interchange patterns have on interaction dynamics might facilitate the emergence of hierarchical structures that can lead to the emergence of status beliefs. However, in the example shown in panel (b), the effect of the existing patterns is less certain, given that they might either benefit the status of the members of category A (if A_1 interacts with B_2) or might undermine it (if A_2 interacts with B_2).

Taken together, to date we know little about the dynamics that in groups larger than the dyad might lead to the emergence of status beliefs. Given that in today's societies many interactions with a collective task focus take place in groups larger than the dyad, we lack knowledge about a sizable share of the interactions that might be involved in the creation of social inequality. In this dissertation, I therefore address the following research question:

Research Question 1: How do the principles of task focused interaction that the expectation states framework describes for groups larger than dyads affect the formation of status beliefs in such groups?

1.3.1.2 The assumption of random interactions

The formal modeling work presented by both Ridgeway and Balkwell (1997) and Mark et al. (2009) suggests that status construction processes are a potent force in the creation of status differentiation and that there should be a strong tendency for social distinctions to attain population-wide status value. This notion is intriguing from a theoretical point of view, but it often seems to be inconsistent with empirical evidence. While it is clear that in most societies there are social distinctions with widely consensual status value, it is also clear that the status value of many social distinctions varies widely across the population. Consider, for example, the status value that gender has across the USA. Although gender is generally considered a status characteristic that favors men over women in most societies, Rice and Coates (1995) reported that the status advatange of men tends to be lower in the North than in the South of the USA. Even more, Gilleard and Gurkan (1987) reported stark differences in Turkey in the status that the old receive compared to the young in urban and rural areas. While in rural areas older men have very high status compared to the young, in cities they tend to have a comparatively lower status. If status construction processes are such a potent force in the creation of status differentiation, how can we explain persistent regional variation in the status values of certain social distinctions within a given society?

As indicated in Section 1.1, earlier research suggests that one reason might be regional variation in resource and power differences between the members of the different social categories. Such differences will undoubtedly have played an important role in many of the cases of regional variation in status values that we observe today. Yet, in this dissertation, I explore the possibility that regional variation in status values might derive from the interactional processes that the expectation states framework and status construction theory describe, even in the absence of regional variation in resource and power differences. I argue that for this it is crucial to recognize that interactions with a collective task focus between the members of a given population do not occur at random, as assumed by both Ridgeway and Balkwell (1997) and Mark et al. (2009). Instead, interactions tend to be strongly patterned by spatial distances.

A large body of empirical research suggests that face-to-face interactions are generally constrained by spatial distance, so that individuals who live closer to each other are more likely to interact than individuals who life further apart. For example, there is evidence that in the organizational context, in which most every-day interactions with a collective task focus take place, spatial distances negatively affect the occurrence of interactions (Balland, 2012; Katz, 1994; Niles & Hanson, 2003; Ponds, Van Oort, & Frenken, 2007; Rouwendal, 1999). The same applies to virtually all other face-to-face interactions that take place between individuals (cf. Faust, Entwisle, Rindfuss, Walsh, & Sawangdee, 1999; Mok, Wellman, & Basu, 2007). From a social network perspective, the occurrence of interactions between two individuals can be represented as a social tie between them and, given the effect that distance has on interactions, existing research suggests that such networks tend to be *spatially clustered* (Wong, Pattison, &

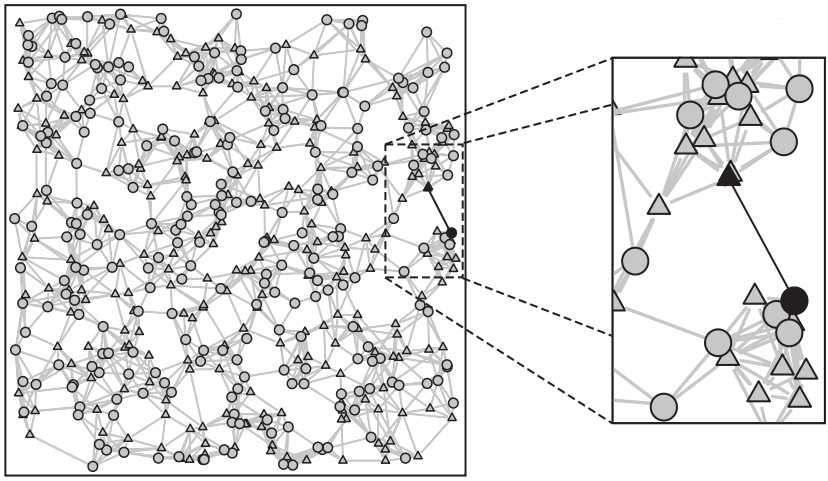

Figure 1.2 Illustration of spatial network clustering with detail view. Triangles and circles represent individuals with the states of the social distinction $N_i = A$ and $N_i = B$ respectively. Lines between individuals indicate the possibility for interactions between them.

Robins, 2006). This means that interaction networks are typically sparse, so that only few of the many possible ties are realized, and that those interactions that actually occur tend to take place among individuals who live in comparatively close physical proximity to each other. Consequently, there often are communities of actors who are highly connected internally, but loosely connected to members of other highly inter-connected communities (Wong et al., 2006). Figure 1.2 illustrates such a spatially clustered network structure for a hypothetical population spread across a two-dimensional landscape. As the detail view illustrates, the two focal individuals are members of two different communities, so that they share many of their ties with those who live close to them but share none of their ties with each other.

Abstracting from network structures and their relation to spatial distances, as both Ridgeway and Balkwell (1997) and Mark et al. (2009) have done, is a useful simplification because it greatly facilitates the formal modeling of diffusion processes (cf. Epstein, 1999; Macy & Flache, 2009). However, related research on the diffusion of innovations, opinions, and diseases shows that network clustering can affect the spread of such objects in larger populations. Specifically, network clustering can facilitate the emergence of local consensus in opinions, beliefs, and attitudes, while at the same time inhibiting their spread throughout the larger population (Flache & Macy, 2011). Therefore, when it comes to diffusion processes, network clustering can lead to a situation of population-wide diversity with local convergence. In this dissertation, I explore the possibility that spatially clustered interaction networks might in a similar way account for regional variation in status values, given the behavioral and cognitive process that the expectation states framework and status construction theory describe.

That is, I address the following research question:

> *Research Question 2: Can status construction processes explain regional variation in status values when the spatial clustering of interactions with a collective task focus is taken into account?*

1.3.2 Part 2: The laboratory and scope conditions

In the context of collectively oriented, task focused groups, research in the expectation states framework has significantly advanced our understanding of the processes that can lead to the emergence of status differentiation. Despite these advances, I argue that we know comparatively little about how these processes play out in much of the real world. The reasons for this are twofold. First, existing research in the expectation states framework is mostly conducted with ad hoc created laboratory groups. Second, existing research almost exclusively concentrates on groups with a collective task focus. In this section, I discuss each of the two limitations in turn and formulate corresponding research questions that remain unanswered so far.

1.3.2.1 Task focused interaction outside the laboratory

As indicated in Section 1.2, research in the expectation states framework focuses on groups whose members worked on a collective task in the setting of the laboratory. In this setting, participants were typically unacquainted with each other and interactions took place for a limited period of time via a computer terminal (for a description of the standard experimental protocol of the expectation states framework see Berger et al., 1977). To understand why such a setting might limit the generalizability of existing findings, it is helpful to first consider how individuals might react to status differentiation in every-day life.

Research in the extant status literature commonly assumes that status has subjective value to individuals, given the influence, power, and privileged access to valued resources that come with it (Anderson, Hildreth, & Howland, 2015; Frank, 1985; Magee & Galinsky, 2008). This makes status similar to other valuable commodities that individuals strive for, but it is also different from many ‘normal’ commodities because status is ‘zero-sum’ (Frank, 1985). This means that the increase in status of one person necessarily implies a decrease in the status of at least one other person. To illustrate this, consider a group in which all group members are equally respected. In such a context, nobody will be in a position to exert more influence or to acquire privileged access to resources. Yet, as soon as one group member is more respected than others, he/she will receive these benefits at the costs of all other group members. Consequently, striving for status has the tendency to generate positional treadmills on which individuals compete with each other for the respect of their peers (cf. Loch, Huberman, & Stout, 2000). Additionally, status is not something that can be owned independently of others, such as an expensive car. Instead, status is a purely relational commodity that is conferred by others (Magee & Galinsky, 2008). Therefore, in group settings, those who demand status are those who control its supply (Blau, 1964; Brennan & Pettit, 2004).

The fact that status is a zero-sum commodity that needs to be provided by those who

compete for it can create conflicting pressures for individuals, even in group settings with a collective task focus. This dilemma derives from the fact that individuals need to engage in some form of trade-off between acting in a way that is best for the group and acting in a way that is good for their own status. That is, on the one hand, a given individual might help the group by using respect as a selective incentive to motivate others to perform well and thereby act in the best interest of the group. On the other hand, the individual might try to withhold respect from others in an attempt to maintain or even enhance their own status position in the group.

Given these conflicting interests and competitive pressures, the process of hierarchy formation in real life groups has been compared to a political process (Anderson & Kennedy, 2012) in which individuals often compete for high status positions by trying to convince others of their superior qualities, even when they are not superior at all. In this process, they might even try to actively undermine the status position of others to increase their own ranking in the group (Bendersky & Hays, 2012). Status competition therefore has the potential to undermine the functioning of task focused groups (Loch et al., 2000) and some scholars even argue that in the organizational context the threat to performance is so high that management will often need to channel status competition into the right direction (Loch, Galunic, & Schneider, 2006).

A second factor that potentially makes the status allocation process problematic is the fact that individuals often value the friendship and social support of their peers. Similar to status, strong, supporting social relations have value to individuals, because they can provide them with indirect access to valuable resources, such as information and political and emotional support (cf. Koster, Stokman, Hodson, & Sanders, 2007). Yet, active status competition tends to undermine such relations due to the conflict and tensions that it can generate among direct competitors. Therefore, a concern for the social relations with their peers might affect the way individuals confer and compete for respect.

Taken together, concerns for status competition and social relations might affect individuals' willingness to confer status for performance in group settings. In the laboratory settings employed in earlier research, concerns for status competition and social relations are unlikely to play a strong role in the status conferral behavior of participants. This is because in theses settings, interactions are typically so short-lived, artificial, and impersonal that individuals might not expect to gain much from high status and cannot possibly develop social relations with their interaction partners. In enduring groups outside the laboratory, by contrast, concerns for status competition and social relations might affect individuals' willingness to make their gestures of respect and deference contingent on the performance of others, even when the main purpose of the group is to successfully accomplish some collective task. To date, how individuals trade-off the concerns that I have just described remains unexplored, as do the factors that might affect these decisions. Therefore, this dissertation addresses the following research question:

> *Research Question 3: Under which conditions are the members of groups with a collective task focus outside the laboratory willing to show respect and deference for high performance of other group members?*

1.3.2.1 The absence of a collective task focus outside the laboratory

Groups with a collective task focus are important building blocks of society and certainly play a significant role in both shaping and re-enforcing status differentiation and social inequality. However, many group settings without a collective task focus still play an equally significant role. Consider school classes as just one example. The performance that individuals show at school and the educational choices that they make during this period will affect them for the rest of their lives. Existing research suggests that being confronted with the content of existing stereotypes regarding the academic abilities of the social categories that individuals belong to (e.g., 'women can't do math', 'blacks are worse at academic tasks than whites', etc.) can induce cognitive stress that can lead to reduced performance in precisely this area (Nosek, Banaji, & Greenwald, 2002; Steele & Aronson, 1995; Steele, 1997). This contributes to the maintenance of existing stereotypes and can even induce low status individuals to select themselves out of educational fields in which they are expected to perform poorly (Correll, 2004; Ridgeway, 2011). Therefore, being confronted with ability and competence stereotypes at school might have lasting effects for the concerned individual and might lead to the re-enforcement of existing stereotypes.

Correll and Ridgeway (2003) argued that many of the cognitive processes that the expectation states framework describes should also occur in settings without a collective task focus. In particular, status generalization processes should affect the abilities that people attribute to each other, even when they do not have to work on a collective task with each other. Correll and Ridgeway argued that status characteristics should affect ability attributions whenever individuals have to engage in comparative ability evaluations, because "[t]he anticipation of [such comparison] creates a pressure for actors to assess their task competence relative to others who they imagine are also being or have been evaluated" (Correll & Ridgeway, 2003, p. 47). In such a context, the information that ability and competence stereotypes associated with salient status characteristics provide can affect individual judgments, because they provide at least some information that enables individuals to evaluate each other.

While the arguments of Correll and Ridgeway (2003) are compelling, there is also reason to expect that status generalization might play out differently in groups with no collective task focus. As indicated in Section 1.2, in group settings with a collective task focus, ability and competence evaluations are motivated by the goal to coordinate group work effectively so that the group's goal will be attained. This context creates a pressure among group members to assess each other's abilities as accurately as possible, given the information that is available. In groups without a collective task focus, such a pressure toward accurate assessments is missing and, therefore, motives other than 'accuracy' might become more important in the ability attribution process. In particular, recent experimental research by Oldmeadow and Fiske (2010) suggests that the notion of belonging to a low status group might create a negative self-image in individuals, which they try to enhance by rejecting existing ability stereotypes in the attribution process. That is, it seems that when members of low status groups have to assess the abilities of members of their own group in a context without a collective task focus, they tend to attribute higher abilities and competence to the members of their own group than members

of other groups would do. To date it remains unexplored to what extent this process intervenes in status generalization processes in enduring groups outside the laboratory.

Taken together, hitherto we know relatively little about how the cognitive processes that affect ability attributions in enduring groups without a collective task focus. In this dissertation, I focus on the effects that status characteristics have on ability and competence attributions and address the following research question:

> *Research Question 4: How do status characteristics affect ability and competence attributions in enduring groups without a collective task focus?*

1.4 Methodological Approach and Data

The research questions that I address in the different parts of this dissertation differ in their analytical focus. The questions formulated in Part 1 focus on the dynamics that can lead to the emergence of status differentiation between social groups in small and large collectives (i.e. in small groups and in the population), from a theoretical point of view. The research questions in Part 2, by contrast, focus on the conditions under which certain fundamental cognitive and behavioral processes occur outside the laboratory, from an empirical point of view. Accordingly, I chose different research methods to answer the different questions.

1.4.1 Part 1: Social complexity and agent-based computational modeling

Ridgeway and Balkwell (1997, p. 15) highlighted that the arguments of status construction theory are complicated and their logic is difficult to evaluate when they are only formulated verbally. This is one of the reasons why both Ridgeway and Balkwell (1997) and Mark et al. (2009) chose formal modeling techniques (i.e. difference/differential equations) to rigorously assess the logical implications of the theory. Undoubtedly, by moving from the dyad to larger groups and by introducing the notion of spatial network clustering, developing hypotheses about the outcomes of status construction processes becomes even more complex and more difficult without the use of formal modeling techniques. In this dissertation, I chose agent-based computational modeling to deal with this increased complexity.

Agent-based computational modeling is a relatively new approach to research in the social sciences that has its roots in computer science and artificial intelligence (Macy & Flache, 2009, p. 247). With this approach, societal phenomena such as the emergence of social institutions, social segregation, and the spread of innovations are studied from the ‘bottom up’, by simulating the behavior and interactions of the individuals that make up society (Epstein & Axtell, 1996; Gilbert & Troitzsch, 2005; Gilbert, 2008; Macy & Flache, 2009; Macy & Willer, 2002). Compared to other formal modeling techniques, agent-based computational modeling is particularly useful when individual behavior can be assumed to be non-linear and characterized by if-then rules, when individuals show learning and adaptation, and when interactions occur in network structures (paraphrased from Bonabeau, 2002, pp. 7280–7281). Each of these factors applies to the processes and social systems that I study in Chapters 2 and 3 of this dissertation; agent-based computational modeling therefore is particularly suitable for my purposes.

Advocates of agent-based computational modeling highlight the fact that developing

simulation models forces researchers to explicate their theoretical assumptions about the processes under consideration (cf. Billari, Ongaro, & Prskawetz, 2003). However, existing theories are often not specific enough to provide unambiguous information as to how certain model aspects should be implemented (cf. Harrison, Lin, Carroll, & Carley, 2007). According to critics of agent-based computational modeling, this led to a form of 'anarchy' in terms of how the same processes are implemented in different simulation models (Richiardi, Leombruni, Saam, & Sonnessa, 2006) and led to the introduction of seemingly arbitrary assumptions and parameter values (Waldherr & Wijermans, 2013). This dissertation addresses these criticisms in two ways. First, my models build on existing simulation models. I aimed to keep the changes in these models to a minimum, so that my results are maximally comparable to those presented in earlier research. Second, whenever possible, I aimed to base my assumptions and model parameters on empirical research concerned with formalizing and predicting the behavioral and cognitive processes that the expectation states framework describes. Thus, I could keep the ad hoc assumptions and parameterizations to a minimum.

1.4.2 Part 2: A network approach to status processes in the field

Studying status processes in enduring groups outside the laboratory is complicated by the fact that observations of status-related outcomes are often statistically interdependent. For example, individuals might be aware of the abilities and competence that other group members attribute to each other and this might affect their own attributions. Ignoring such influence processes can be particularly problematic if we are interested in studying the effects that status characteristics have on ability and competence attributions. To illustrate this, consider again the small problem solving groups shown in Figure 1.1. If individual B_1 has managed to build a reputation as being particularly intelligent, many other group members will attribute high competence to this particular individual. If we neglect that these attributions all share the same target, it might appear that members of category B are on average viewed as more competent than members of category A, even if the ability attributions that B_2 receives are not very different from the attributions that A_1 and A_2 receive.

The few existing studies that examined status processes as described in the expectation states framework in enduring groups (e.g., B. P. Cohen & Zhou, 1991; York & Cornwell, 2006) largely neglected the problem of statistical interdependence in their data. By contrast, studies in the status literature at large recognized this problem (Agneessens & Wittek, 2012; Wittek, 1999). In line with this earlier research, I address the issue of statistical interdependence by using statistical methods that originated in the area of social network analysis. As indicated in Section 1.3, in a social network perspective, relational objects between individuals (such as interactions, friendships, family relations, etc.) are represented as ties and it is well known that the probabilities with which such ties exist are often statistically interdependent (Lusher, Koskinen, & Robins, 2013). Over the last years, social network researchers therefore developed increasingly sophisticated methods that enabled them to deal with this issue. In this dissertation, I build on these developments by conceptualizing central status outcomes as ties that generate social network structures, which can be analyzed with tools from social network analysis.

The data that I use in the empirical analyses come from two sources. The first source is a

longitudinal study that colleagues and I conducted in a medium-sized Dutch childcare organization. The study involved four departments that shared a focus on treating non-institutionalized children with special social and psychological needs. The departments consisted of 16–42 staff members who were either directly involved in treating the children or had supportive functions. Data collection took place by means of paper-and-pencil questionnaires distributed in spring and autumn 2011. The questionnaires consisted of two parts. The first part had a round robin design that asked respondents to rate the other members of their department on several characteristics. The second part consisted of respondents' self-ratings on various social-psychological measures and questions about demographic characteristics. Together, these two parts of the questionnaire enabled me to address Research Question 3.

The second source is data collected in November 2010 as part of the project 'Wired into Each Other: Network Dynamics of Adolescents in the Light of Status Competition, School Performance, Exclusion, and Integration' conducted at the Research Center for Educational and Network Studies (RECENS). The data comprise information from pupils of 43 classes (in grade 9) from seven public schools distributed across Hungary. The survey contained social network modules, which gave pupils a roster with the names of their classmates and asked them to indicate those who they perceived to possess different attributes. Additionally, pupils were asked several demographic background questions, which, together with the social network items, enabled me to answer Research Question 4.

1.5 Outline of the Book

The first part of this book comprises Chapters 2 and 3, and focuses on the complex dynamics involved in status construction processes in order to answer Research Questions 1 and 2. The second part comprises Chapters 4 and 5, and focuses on the basic behavioral and cognitive processes that the expectation states framework describes outside the laboratory in order to answer Research Questions 3 and 4

In Chapter 2, I develop an agent-based computational model of interactions in small groups with a collective task focus. The model builds on earlier simulation models that centered on the formation of hierarchical differentiation in small groups (e.g., Skvoretz & Fararo, 1996) and draws on earlier formalizations of task focused interaction as described in the expectation states framework (e.g., J. W. Balkwell, 1991a). I use this model to study (1) whether the basic principles of task focused interaction that the expectation states framework describes systematically favor the emergence of status beliefs in groups larger than dyads and (2) how this emergence is affected by the timeframe over which small groups interact and the exact size of the group. Additionally, (3) I explore the possibility that status beliefs might affect the interactions in the groups in which they were acquired. To the best of my knowledge, no studies examined how the experience of consistent hierarchical differentiation between, say, men and women in a given group affects the performance expectations that group members have for each other, if gender previously had no status value. If beliefs affected performance expectations in the context in which they were acquired, this might greatly contribute to the maintenance of the behavior interchange patterns that led to their emergence. From a theoretical

point of view, I cannot rule out this possibility and therefore I explore the dynamics that such a process might generate.

In Chapter 3, I model belief emergence and diffusion processes in the context of spatially clustered interactions in larger populations. The model builds on and extends the model of status construction processes developed by Mark et al. (2009). The work presented in this chapter is similar in spirit to this earlier work, but it is also decisively different. Mark et al. showed how the interplay of some of the micro-level mechanisms described in that status construction theory could generate population-wide consensus in the status value of a given social distinction. In Chapter 3, I show how the individual-level mechanisms that status construction theory describes can lead to diversity in the status value of a given social distinction, when they are combined with the macro-level condition of spatially clustered interaction networks. Thus, I uncover a social dynamic that can lead to diversity in status beliefs, which previously was not in the scope of status construction theory. To generate network structures that resembled structures observed in real life, I draw on empirical work concerned with predicting the effect that spatial distances have on the occurrence of face-to-face interactions (e.g., Daraganova et al., 2012).

In Chapter 4, I turn from exploring the emergence of status differentiation between social groups to examining some of the basic behavioral and cognitive process involved in the creation of status differentiation outside the laboratory. I focus on organizational teams as one archetype of groups with a collective task focus and draw on related management (e.g., Doerr, Freed, Mitchell, Schriesheim, & Zhou, 2004; Koster et al., 2007) and small group research (e.g., Bianchi & Lancianese, 2007; Blau, 1964) that suggests that the amount of task interdependence and informal interdependence that individuals experience in such a context might crucially affect their willingness to confer status to group members who make outstanding contributions to the collective task. The argument is based on the assumption that these forms of interdependence affect the costs and benefits that individuals expect to derive from conferring status to others. When team members experience higher levels of task interdependence, they will perceive their own outcomes more depended on the performance of their colleagues and will therefore expect to benefit more from motivating these colleagues to higher performance. Consequently, they will be more willing to reward high performance with respect. When team members experience higher levels of informal interdependence, by contrast, they will be more concerned that performance-based status differentiation might undermine the strong social bonds that exist in the team. Therefore, they will be less willing to make their respect contingent on performance.

In Chapter 5, my focus remains on small groups outside the laboratory, but I move to a context that lacks a collective task focus and explore how status characteristics affect ability attributions in such a context. Additionally, I explore an alternative mechanism that might intervene in status generalization. Recent experimental research suggests that a need for positive self-esteem can induce in-group favoritism that leads status beliefs to affect members of status-advantaged and disadvantaged categories differently (Oldmeadow & Fiske, 2010). In this view, men tend to attribute higher abilities to other men but women tend to reject such differences and attribute equal abilities to men and women. If in-group favoritism indeed affects

ability attributions, we might not find a uniform effect of status characteristics. I do not claim to be the first to recognize that in-group favoritism might affect status generalization (cf. Foschi et al., 1994; Oldmeadow, Platow, Foddy, & Anderson, 2003). However, to date the relative importance of the two processes has not been examined in the field.

Chapter 6 closes this dissertation with a summary of the main findings and a discussion of implications for future research. Finally, I discuss how the research presented in this dissertation significantly advances our understanding of the processes involved in the creation of status differentiation between individuals and social groups.

Part 1

The Complexity of Status Construction Processes

Chapter 2

An Agent-Based Model of Status Construction in Task Focused Groups*

Abstract

Status beliefs link social distinctions, such as gender and race, to assumptions about social worth and competence. Recent modeling work in status construction theory suggests that interactions in small groups with a collective task focus can lead to the spontaneous emergence and diffusion of such beliefs in larger populations. This earlier work has focused on dyads as the smallest possible groups in which status beliefs might emerge from face-to-face interaction. In today's societies, however, many task focused interactions take place in groups larger than dyads. In this chapter, we therefore develop an agent-based computational model that enables us to study the emergence of status beliefs in groups larger than dyads. With this model, we address questions such as: do basic principles of task focused interaction systematically favor the emergence of status beliefs in groups larger than dyads? Does the timeframe over which small groups interact affect the likelihood with which status beliefs emerge? How does group size affect the emergence of status beliefs? Computational experimentation with the new model suggests that behavioral principles known to spontaneously create hierarchical differentiation between individual group members also tend to align these hierarchies with categorical differences and thereby facilitate the emergence of status beliefs. This tendency is stronger in smaller groups, and in groups that interact either for a very short or very long time.

*This chapter is co-authored with Andreas Flache and Rafael Wittek. A slightly modified version has been published as Grow, A., Flache, A., & Wittek, R.P.M. (2015). An Agent-Based Model of Status Construction in Task Focused Groups. *The Journal of Artificial Societies and Social Simulation*, *18*(2), 4.

2.1 Introduction

Men are frequently expected to be better at math than women (Nosek et al., 2002), white students are often assumed to perform better than black students (Steele & Aronson, 1995), and physically attractive people are often assumed to be more competent than unattractive people (Jackson, Hunter, & Hodge, 1995). Each of these observations illustrates how status characteristics can affect the abilities and skills that others expect us to possess. A status characteristic is any social distinction that separates individuals into at least two categories believed to differ in social worth and competence (Berger et al., 1977). Status characteristics shape interactions and are an important source of inequality. Social scientists therefore have a long-standing interest in explaining how social distinctions attain status value (e.g., C. Balkwell & Balswick, 1981; Hendrix & Hossain, 1988; Sanderson et al., 2005; Stover & Hope, 1984).

A classical explanation for the creation of status characteristics is based on statistical association (e.g., Bielby & Baron, 1986; Phelps, 1972). According to this reasoning, a trait like gender can become a status characteristic if members of one gender are on average more resourceful in terms of income, education, and competence than members of the other gender.

More recently, Mark et al. (2009) described a mechanism by which social distinctions can attain status value, even in the absence of resource differences between members of different categories. Drawing on status construction theory (Ridgeway, 1991, 2000; Webster & Hysom, 1998) and related research on the emergence of status hierarchies in groups with a collective task focus (Bales, 1950, 1970), Mark et al. highlighted that task focused groups can spontaneously develop hierarchies of influence and deference in which some individuals appear more competent than others, even if only by accident. When hierarchical differentiation occurs consistently between members of different social categories, group members can come to believe that the distinction generally coincides with competence differences. Once emerged, such beliefs can diffuse throughout the population, because individuals carry them into new group contexts, treat new interaction partners accordingly, and thereby create hierarchies that teach their beliefs to others. By that, status beliefs can both emerge and spread, even when there are no objective resource differences between members of the different social categories.

In their formal modeling efforts, Mark et al. (2009) focused on dyads as the smallest possible groups in which hierarchical differentiation can occur. Focusing on dyads is a useful starting point for examining status construction processes, because it allows us to abstract from some of the complex interaction dynamics that might develop in larger groups. For instance, in dyads any hierarchical differentiation that might emerge is necessarily fully aligned with any social distinction that differentiates group members. This enables us to abstract from more complex hierarchical structures that might arise in larger groups and might provide partially contradicting information about competence differences between members of different social categories. However, many of the task focused interactions that take place in today's societies occur in groups larger than dyads. If we want to assess the importance of status construction in the creation of social inequality, we need to understand the emergence of status beliefs under

such more complex conditions.[2]

In this chapter, we contribute to research in status construction theory by developing an agent-based computational model that combines insights into hierarchy formation in groups larger than dyads (e.g., Fisek et al., 1991) with insights into status belief formation (e.g., Ridgeway & Correll, 2006). By that, we complement Mark et al.'s (2009) study of belief diffusion at the population level with a study of the factors that might facilitate belief emergence at the group level. We address questions such as: do basic principles of task focused interaction systematically favor the emergence of status beliefs in groups larger than dyads? Does the timeframe over which small groups interact affect the likelihood with which status beliefs emerge? How does group size affect the emergence of status beliefs?

To preview results, our computational experiments suggest that behavioral principles known to spontaneously create hierarchical differentiation between individual group members also tend to align these hierarchies with categorical differences and thereby facilitate the emergence of status beliefs. Formulated differently, our results suggest that task focused interaction in small groups might have an inherent tendency to create conditions that facilitate the emergence of status beliefs. This tendency is stronger in smaller groups, and in groups that interact either for a very short or very long time.

In what follows, we first describe the theory that underlies our model. Next, we present the model itself and subsequently submit it to systematic computational experiments. We close the chapter with presenting the results of our experiments and discussing their implications for future research.

2.2 Task Focused Interaction and Status Beliefs

Status construction theory is part of the expectation states framework – a set of theories that examine the emergence of hierarchical differentiation in newly established groups with a collective task focus (for overviews of the framework see Correll & Ridgeway, 2003; Wagner & Berger, 2002). In this framework, hierarchical differentiation is defined as inequalities in task participation and influence among group members; collective task focus means that group members perceive successful task completion as their primary goal and that success can only be reached through teamwork (cf. Berger et al., 1977, 1980). Those group members who are relatively more active on the task and whose opinions have more weight in decision-making processes hold higher ranks in the group's hierarchy.

Examples of groups that fit the framework's scope are student learning groups and work teams. The tasks that such groups fulfill vary considerably. We focus on small discussion groups as a prototype of task groups that have frequently been studied in empirical research and simulation studies. Members of such groups have to develop a solution for complex problems that may not have objectively correct solutions. Theoretical and empirical research in status

[2] Ridgeway and Balckwell (1997) have developed a model of status construction theory that also accommodates groups larger than dyads. However, in this model status beliefs cannot emerge without an objective association between the social distinction and valuable resources. Our modeling efforts focus on the spontaneous emergence of status beliefs in the absence of such an association.

construction theory has focused on social distinctions that create two categories (e.g., gender with the categories 'man' and 'woman'). We follow this tradition here and refer to members of the different categories with the letters *A* and *B*. Here we assume that this salient characteristic is the only attribute that initially differentiates group members.

Drawing on the expectation states framework, we first review behavioral processes that can lead to the emergence of hierarchical differentiation between individuals, even in the absence of resource and competence differences among them. Subsequently, we review how the observation of consistent hierarchical differentiation between members of different social categories can lead to the emergence of status beliefs. Finally, we discuss how small group interaction might bring about such consistency, and thereby status beliefs.

2.2.1 The emergence of hierarchical differentiation

The expectation states framework builds on the notion that when previously unacquainted individuals meet in a group setting with a collective task focus, "they act as if one of the subtasks of the group is to decide who has high and who has low ability at the task – thus to take advantage of high ability members and not be misled by low ability members" (Driskell, 1982, p. 232). Assumptions about relative abilities are represented by *performance expectations* (Berger et al., 1977) that group members hold for each other. Performance expectations affect the way group members coordinate their work on the task (J. W. Balkwell, 1991a; Berger et al., 1980; Driskell, 1982). First, those who are expected to perform relatively better than others are more likely to receive *performance opportunities*. This means that they are more often asked for their opinion, more often receive the opportunity to make suggestions, and are given more time to elaborate their views. Second, the contributions of those who are expected to perform relatively better receive more positive *performance evaluations*. This means that even when their suggestions are qualitatively similar to the suggestions of group members for whom performance expectations are relatively lower, their suggestions are still more likely to be accepted and appreciated.

When individuals lack objective information about each other's competence, they look for cues that might provide such information. The two cues relevant in the context of this chapter are *status characteristic*s and *behavior interchange patterns* (Fisek et al., 1991; Webster & Rashotte, 2010). Status characteristics are connected to beliefs about competence differences between members of different social categories. For instance, when gender is a status characteristic that favors men over women, individuals tend to believe that men are generally more competent than women. Performance expectations therefore tend to be higher for male than for female group members. Behavior interchange patterns are interactions among group members that might indicate competence differences between them. For example, when group member A_1 appreciates and accepts the suggestions of group member A_2, whereas A_2 criticizes and rejects A_1's suggestions, a behavior interchange pattern becomes established in which A_2 appears more competent than A_1. Therefore, group members are more likely to pay attention to A_2's suggestions, even compared to the other group members A_3, A_4, and A_5, who were not themselves involved in the interaction. Conversely, group members are likely to pay less attention to A_1's suggestions, even compared to other group members.

Both status characteristics and behavior interchange patterns tend to create stable hierarchical differentiation between group members, even in the absence of objective competence differences. When there are status differences between social categories from the outset, the relatively higher performance expectations that group members have for members of a status-advantaged category will lead the members of this category to dominate group interaction (Berger et al., 1977). In the absence of salient status characteristics, individuals who manage to make suggestions accepted by others in an early phase of group interaction increase the performance expectations that the rest of the group have for them. This leads to a "self-fulfilling prophecy" (Meeker, 1994, p. 107) in which they become more likely to receive subsequent performance opportunities and their subsequent suggestions are more likely to be evaluated positively. This implies that small, randomly created status differences tend to grow and become stable over time (cf. Lynn et al., 2009; Skvoretz & Fararo, 1996).

2.2.2 The emergence of status beliefs

Individuals tend to infer competence differences from behavior interchange patterns. When such patterns are juxtaposed with differences in a salient social distinction (e.g., men generally accept the suggestions of women, whereas women generally reject the suggestions of men), there is a chance that group members "misattribute" (Webster & Hysom, 1998, p. 357) seeming competence differences to differences in the distinction. That is, they acquire status beliefs that turn the distinction into a status characteristic.

The likelihood with which such belief acquisition takes place depends on how *comprehensively* and *consistently* the social distinction is associated with apparent competence differences (Ridgeway, 2000, pp. 96–97). Comprehensive means that individuals observed several behavior interchange patterns between different members of different social categories (Ridgeway, 2000). Consistent means that in these patterns members of one category generally appeared in the higher competence role, whereas members of the respective other category almost invariably appeared in the lower competence role (Ridgeway & Correll, 2006; Ridgeway, 2000). When both conditions are met, individuals tend to have little doubt in the observed association and are thus likely to acquire a corresponding status belief.

Even when individuals doubt an observed association between categorical differences and competence, they have reason to act as if they would personally believe it. Consistent displays of influence and deference between members of different categories imply some degree of consensus among others as to who should assume leadership roles and who should have the chance to contribute to important collective tasks (Ridgeway & Correll, 2006). Acting against such consensus bears the risk of social "backlash" (Ridgeway, Backor, Li, Tinkler, & Erickson, 2009, p. 47) that can incur significant costs for the individual. This creates a subjective incentive to comply with the perceived consensus.

2.2.3 The emergence of consistent hierarchical differentiation

As highlighted in Section 2.1, Mark et al. (2009) focused on dyads as the smallest possible group in which hierarchical differentiation can emerge. If there are only two individuals, who

differ in a salient social characteristic, any hierarchy that emerges will consistently favor one of the two categories to which they belong. In larger groups, more complex hierarchical structures can emerge and these structures might undermine belief formation. Additionally, the outcome of an interaction between two group members not only affects the performance expectations that these group members have about each other, but also the performance expectations of the remaining group members. To date, it has remained unexplored how this increased complexity affects status construction processes.

We expect that interaction in task focused groups, as described in the expectation states framework, tends to create consistent hierarchical differentiation between members of different social categories, even in groups larger than dyads. A thought experiment helps understanding why.

Imagine a group of six individuals, three belonging to category A and three belonging to category B. Assume that B_1 has made a suggestion for solving the task to A_1 and that after some arguing A_1 has accepted this suggestion. This establishes a behavior interchange pattern between them, which increases group members' performance expectations for B_1 and decreases their performance expectations for A_1, relatively to the rest of the group. Consequently, the likelihood that B_1 will make a subsequent suggestion increases and when such a suggestion is directed at A_2 or A_3, it is more likely than before to be accepted. When this happens, the initial inequality among members of different categories, as observed in the interaction between A_1 and B_1, is reproduced and strengthened. Similarly, the likelihood that A_1 will make a subsequent suggestion decreases and when such a suggestion is directed at B_2 or B_3, it is more likely than before to be rejected. In addition, in this case, the initially observed inequality between members of different categories is reproduced and strengthened.

Evidently, the information that initially supports the belief that Bs are more competent than As is only based on the interaction between B_1 and A_1 and is thus not very comprehensive. Therefore, it is not very likely to induce status beliefs among group members. However, as more As are cast into lower hierarchical positions through their interactions with B_1, and as more Bs are cast into higher hierarchical positions through their interactions with A_1, more information supporting the observed association becomes available, increasing the likelihood that group members will acquire a corresponding status belief.

In sum, we expect that the processes that can lead to hierarchical differentiation between individual group members tend to create consistent hierarchical differentiation between members of different social categories and thereby facilitate the formation of status beliefs. However, our thought experiment disregards other possible interactions in the group, such as between B_2 and A_2/A_3 or between B_3 and A_2/A_3. Such interactions might lead to the development of subsequent behavior interchange patterns that further support or undermine the belief that Bs are more competent than As and the possible number of such interactions quickly increases with group size. Given this complexity, our intuitive reasoning leaves open how likely it is that consistent hierarchical differentiation between social categories arises from the fundamental behavioral processes that the expectation states framework describes and how it is

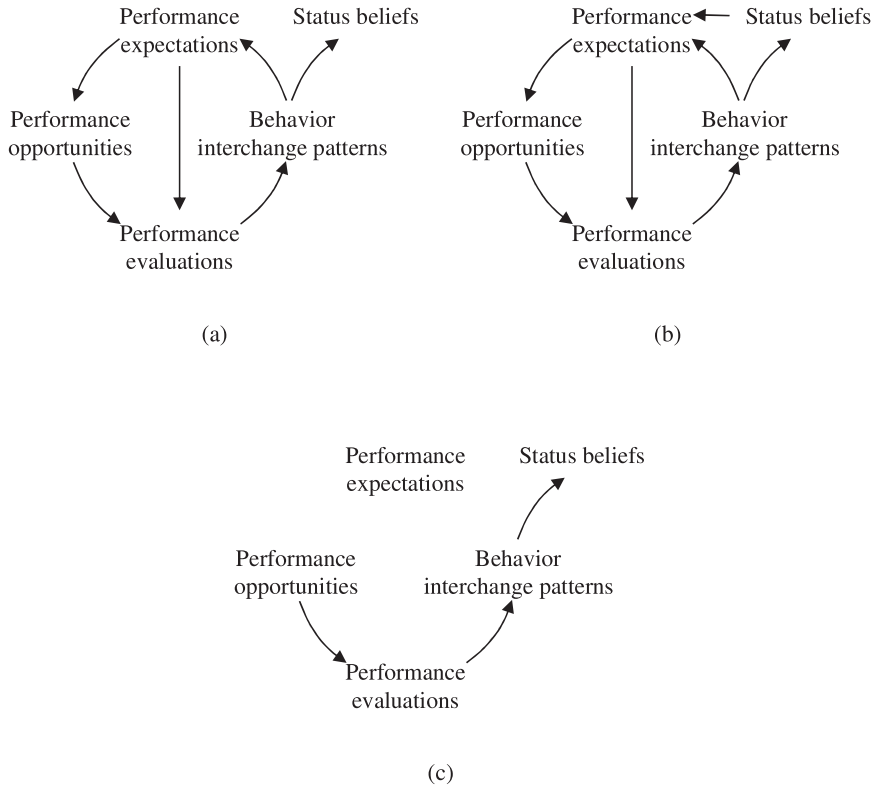

Figure 2.1 Conceptual representation of the interaction cycles used in three versions of the model. Arrows indicate causal links. Panel (a): basic interaction model; panel (b): extended interaction model; panel (c): random interaction model.

affected by group size.

To shed more light on this, we developed an agent-based computational model that we submitted to systematic computational experiments. This approach is particularly useful for studying emergent properties of complex human interaction systems (Bonabeau, 2002; Gilbert & Troitzsch, 2005; Macy & Flache, 2009) and has already provided valuable insights into status dynamics in small groups (for examples see Lynn et al., 2009; Skvoretz & Fararo, 1996). Our model builds on the notion that task directed interaction can be broken down into cyclic patterns (cf. Fisek et al., 1991) and draws on earlier formalizations of task focused interaction (J. W. Balkwell, 1991a; Skvoretz & Fararo, 1996). Panel (a) of Figure 2.1 illustrates the basic cycle that we use in our model. It starts with group members' mutual competence assessments that are represented by performance expectations. These expectations determine the probability that a given group member receives a performance opportunity, in the form of making a suggestion toward another group member. This suggestion, in turn, receives a performance evaluation in the form of acceptance or rejection by the receiver. The outcome of this evaluation can lead to

the establishment of a behavior interchange pattern between the sender and the receiver of the suggestion. Subsequently, the structure of behavior interchange patterns feeds back into performance expectations and can lead to the formation of status beliefs among group members.

One question not yet addressed in status construction theory research is how status beliefs affect interactions in the groups in which they are acquired. To our knowledge, no studies have examined how the experience of consistent hierarchical differentiation between, say, men and women in a given group affects the performance expectations that group members have for each other, if gender previously had no status value. If beliefs affected performance expectations in the context in which they were acquired, this might greatly contribute to maintaining the behavior interchange patterns that led to their emergence. Thus, status beliefs might contribute to their own reinforcement. For our core argument, such an additional reinforcing process is not necessary, because the argument relies on a reinforcing process induced by behavior interchange patterns alone. However, we cannot rule out the possibility that status beliefs might affect the performance expectations in the groups in which they were acquired. We thus explore this possibility.

To do so, we implemented three versions of our model. Panel (a) in Figure 2.1 shows the model that enables us to test our basic argument. In this model, performance expectations are exclusively affected by behavior interchange patterns between individual group members. Status beliefs can emerge, but they do not affect performance expectations in the group in which they were acquired. We call this the *basic interaction model*. Panel (b) shows a less conservative model in which status beliefs can affect performance expectations on top of behavior interchange patterns. We call this the *extended interaction model*. We assess the relative impact that behavior interchange patterns and status beliefs have on the likelihood with which consistent differentiation emerges by comparing the outcomes that the basic interaction model and the extended interaction model create with the outcome of a model in which performance expectations are unaffected by behavior interchange patterns and status beliefs. In this model, interactions essentially occur at random and this enables us to examine how much the behavioral principles that we study contribute to the likelihood that consistent differentiation emerges, over and above pure chance. This *random interaction model* is shown in panel (c). Earlier modeling work has used similar approaches to choose a baseline model for assessing how different social mechanisms affect social structures (cf. Skvoretz, Faust, & Fararo, 1996).

2.3 Modeling Task Focused Interaction

In this section, we describe the agent-based model. We implemented the model in NetLogo version 5.0.5 (Wilensky, 1999). The model code can be downloaded here: https://www.openabm.org/model/4216/version/3. Table 2.1 and Table 2.2 provide overviews of the model's parameters and variables.

2.3.1 Agents and their characteristics

We assume groups with I individuals represented by agents i. There is one nominal social distinction N_i that separates agents into two categories, As and Bs ($N_i \in \{A; B\}$). This

Parameter	Description
I	Number of agents in the group.
I^A, I^B	Number of agents in the group with the states A and B on the nominal social distinction N_i.
γ	Governs the effect that differences in agents' expectation standings E_i have on interaction probabilities in the group.
δ	Governs the effect that agents' expectation standings E_i have on the probability that the suggestion of a given agent i will be accepted/rejected by another agent j.
c	Threshold that r needs to pass for agents to acquire or maintain status beliefs.
a	Probability with which agents adopt a status belief when r $(-r)$ passes the threshold c $(-c)$.
l	Probability with which agents lose a status belief when r $(-r)$ fails to pass the threshold c $(-c)$

Table 2.1 Run-time settable model parameters.

Variable	Description	Level
N_i	Agent i's state on a nominal social distinction.	Agent
S_i	Agent i's status belief that indicates which state of N_i it believes to be associated with higher competence.	Agent
b_{ij}	A directed tie between i and j that represents a behavior interchange pattern between them. The direction and weight of b_{ij} indicates which of the two agents appeared more often in the higher competence role in their dyadic interactions.	Dyad
$\#neg_{ij}$, $\#pos_{ij}$	Pieces of information that agent i perceives to suggest that agent j is less (neg) or more (pos) competent than other group members.	Dyad
e_{ij}	Performance expectation that agent i has for agent j.	Dyad
e^*_{ji}	Average performance expectation that all group members have for agent i.	Group
E_i	Expectation standing that agent i has in the group.	Group
$comp$	Comprehensiveness of past interactions in the group that might be indicative of competence differences between members of the categories A and B.	Group
$\#b_{ij}^{A-}$, $\#b_{ij}^{A0}$, $\#b_{ij}^{A+}$	Number of behavior interchange patterns/ties b_{ij} in which members of category A took the lower (−), higher (+), or the same (0) competence role in their interactions with members of category B.	Group
$cons$	Consistency with which behavior interchange patterns/ties b_{ij} support different status beliefs.	Group
r	Measure of how much $comp$ and $cons$ together support different status beliefs.	Group

Table 2.2 Agent-, dyad-, and group-level variables.

distinction can be imagined to represent gender with the categories man and woman, or skin color with the categories white and black. The numbers of agents with each characteristic in a given group are indicated by I^A and I^B ($I = I^A + I^B$). Each agent has a status belief S_i related to this distinction that can take one of three states A, O, and B ($S_i \in \{A; O; B\}$). When $S_i = A$ or $S_i = B$, agent i believes that agents with the corresponding state on N_i are more competent than agents with the other state; from here on we refer to agents with either state on S_i also as 'agents with status beliefs'; $S_i = O$ indicates that i does not believe that agents who differ in

N_i also differ in competence; from here on, we refer to agents with this state on S_i also as 'agents without status beliefs'.

2.3.2 Performance expectations

Agents' performance expectations for each other can have two sources, behavior interchange patterns and status beliefs. In the basic interaction model, only behavior interchange patterns affect performance expectations. In the extended interaction model, behavior interchange patterns and status beliefs affect performance expectations. In the random interaction model, performance expectations are not affected by these factors and interactions occur at random.

A behavior interchange pattern is established between two agents whenever one of them accepts or rejects the suggestion of the other during discussion. For instance, when agent i for the first time directs a suggestion at agent j and j accepts this suggestion, a behavior interchange pattern becomes established in which i appears more competent than j. However, when j rejects this suggestion, i appears less competent than j. The more often their interactions cast one of them into the more competent position and the other in the less competent position, the more stable the behavior interchange pattern becomes and the more difficult it becomes to remove. That is, when in virtually all their past interactions agent i appeared more competent than agent j, a single interaction that contradicts this pattern is not enough to undermine the impression that i is generally more competent than j.

More technically, we model the structure of behavior interchange patterns in a group as a directed graph with weighted ties between agents. Whenever two agents interact for the first time, a tie b_{ij} is created between them. Initially b_{ij} is undirected and has a weight of 0. When the outcome of i and j's first interaction suggests that, say, i is more competent than j,[3] b_{ij} becomes directed with i as the source and j as the sink and its weight becomes 1. Each subsequent interaction between i and j that supports the current behavior interchange pattern increases the weight of b_{ij} by 1; each subsequent interaction that contradicts the pattern decreases the weight by 1. When a tie takes the weight 0, which is the case when on average none of the two agents appeared more or less often competent, the tie becomes undirected again. When after this change one of the two agents appears in the higher competence role in the next interaction, the tie is assigned a new directionality and its weight is changed accordingly.

Status beliefs affect performance expectations (in the extended interaction model) so that from i's point of view expectations increase for those agents who belong to the category which it believes to be generally more competent. They decrease for those agents that belong to the category which i believes to be generally less competent. This also applies to i itself.

According to the expectation states framework, individuals tend to balance contradicting information from multiple behavior interchange patterns and status beliefs. In this balancing process, the weight of status beliefs is similar to the weight of a single behavior interchange pattern (Webster & Rashotte, 2010). Given a set of observations that suggest that a particular

[3] Either because i rejects a suggestion by j, or because j accepts a suggestion by i.

group member is (not) very competent, additional information that further supports this perception has a decreasing marginal effect on performance expectations. This has been referred to as the *attenuation effect* (Berger et al., 1977). Based on this, we calculate the performance expectation e_{ij} that agent i has for j at moment t as

$$e_{ij,t} = .8^{\#neg_{ij,t}} - .8^{\#pos_{ij,t}}. \tag{2.1}$$

In Eq. (2.1), $\#neg_{ij}$ and $\#pos_{ij}$ are the numbers of pieces of information that, from i's point of view, imply that j has low or high competence respectively. Using $\#neg_{ij}$ and $\#pos_{ij}$ in the exponent with a base smaller than one implements the attenuation effect; the value of e_{ij} is restricted to the range $-1 < e_{ij} < 1$. We provide a detailed discussion of how we arrived at Eq. (2.1) based on existing research in the appendix to this chapter (Section 2.6.1).

As indicated earlier, the three versions of our model differ in the pieces of information that affect performance expectations. In the basic interaction model, each behavior interchange pattern/tie b_{ij} in which j appears in the higher competence role increases the value of $\#pos_{ij}$ by one. Each pattern in which it appears in the lower competence role increases the value of $\#neg_{ij}$ by one. In the extended interaction model, $\#pos_{ij}$ additionally increases by one if j belongs to a social category that i believes to be generally more competent. Conversely, $\#neg_{ij}$ decreases by one if j belongs to a social category that i believes to be generally less competent. In the random interaction model, $\#neg_{ij}$ and $\#pos_{ij}$ are always equal to zero, so that all agents always have the same performance expectations for all group members. [4]

Note that we assume that all agents perceive the behavior interchange patterns that develop in the group in the same way. In the basic interaction model, the performance expectations that different group members have for a particular agent are thus the same. In the extended interaction model, these expectations can vary when there is variation in agents' status beliefs.

2.3.3 Performance opportunities and performance evaluations

Figure 2.1 illustrates that task focused interaction proceeds in two steps. First, one group member receives a performance opportunity in the form of directing a suggestion at another agent. Subsequently, the receiver of this suggestion makes a performance evaluation in which it either accepts or rejects the suggestion. Both the probability that a given agent directs a suggestion at a particular other agent and the probability that this suggestion is accepted or

[4] Note that especially in large groups, the potential for changes in $\#neg_{ij}$ and $\#pos_{ij}$ due to behavior interchange patterns is larger than the potential for changes due to status beliefs. That is, changes in $\#neg_{ij}$ and $\#pos_{ij}$ due to status beliefs are limited to 1, whereas changes due to behavior interchange patterns are limited by group size. Yet, the attenuation effect reduces this 'imbalance', especially when a given agent's status belief contradicts the observed behavior interchange patterns. The reason is that the attenuation effect assigns progressively lower weight to information that further supports a given competence perception. For example, if agent i's status belief suggests that agent j is not very competent, whereas j is involved in three behavior interchange patterns that suggest the opposite, the first pattern has the same weight as i's status belief, but the second and third pattern have a lower weight.

rejected by the receiver depend on the relative expectation standings of the agents in the group. Those agents for which group members have on average higher expectations than for the rest of the group are more likely to be involved in an interaction, either as the sender or receiver of a suggestion. They are also more likely to have their suggestions accepted by their interaction partners.

Technically, e_{ji}^{*} represents the average performance expectation that all group members, including i, have for i. We transform this value (non-linearly) to the range of 0 to 1 by

$$E_{i,t} = \frac{\exp\left(e_{ji,t}^{*}\right)}{1+\exp\left(e_{ji,t}^{*}\right)}, \tag{2.2}$$

where E_i represents the expectation standing of agent i in the group. Based on this, in the basic interaction model and the extended interaction model, the sender of a suggestion is randomly selected from the set of all group members with a probability proportional to E_i^{γ}. Subsequently, the receiver of this suggestion is randomly selected from the set of remaining group members, also with a probability proportional to E_i^{γ}. In both cases, γ ($\gamma \geq 0$) is an exogenous weighting factor that enables us to control the extent to which interactions concentrate among the higher ranking group members. When $\gamma = 0$, performance expectations do not affect the interaction probabilities among agents and all group members are equally likely to be the sender or receiver of a suggestion. The larger γ becomes, the more likely it becomes that agents with higher expectation standings in the group become selected as senders or receivers of suggestions.[5] In the random interaction model, expectation standings have no effect on interaction probabilities and all agents are always equally likely to be selected as the sender or receiver of a suggestion.

After the sender i and receiver j of a suggestion have been selected, in the basic interaction model and the extended interaction model the probability that j accepts i's suggestion is equal to $E_i^{\delta}/\left(E_i^{\delta} + E_j^{\delta}\right)$. The probability that j will reject i's suggestion is equal to $1 - E_i^{\delta}/\left(E_i^{\delta} + E_j^{\delta}\right)$. In both cases, δ ($\delta \geq 0$) is an exogenous weighting factor that enables us to control the extent to which performance expectations affect interactions. When $\delta = 0$, differences in the performance expectations that group members have for i and j do not affect their interaction, so that j is equally likely to accept or to reject i's suggestion. The larger δ becomes, the more a difference between E_i^{δ} and E_j^{δ} to the advantage (disadvantage) of i increases the probability that j will accept (reject) i's suggestion.[6] Note that we use here the expectation standings (E_i) of i and j, rather than the performance expectations (e_{ij}) that i and j personally have for each other. This implements the notion that group members tend to take the performance expectations of other group members into account when interacting with each other (cf. Ridgeway et al., 2009). In the random interaction model, expectation standings have no effect

[5] This approach to modeling the distribution of dyadic interactions in discussion groups is a simplified version of the approach presented by Skvoretz and Farraro (1996) for studying the emergence of hierarchies in real-life groups.

[6] This approach to modeling dyadic interaction is a simplified version of approaches used to estimate acceptance and rejection rates in dyadic interactions as, for example, presented by J.W. Balkwell (1991a, see Eq. (7)).

on the outcomes of interactions, so that suggestions are always equally likely to be accepted or rejected.

2.3.4 Formation of status beliefs

Status beliefs can emerge from a comprehensive and consistent association between behavior interchange patterns and differences in a social distinction. However, if comprehensiveness and/or consistency are low, group members acquire no such beliefs and even might lose existing beliefs. We capture the comprehensiveness of the observed structures with the measure *comp* ($0 \leq comp \leq 1$). This measure is calculated as the number of dyads of agents who differ in the social distinction and who have interacted already (i.e. the number of ties b_{ij} between group members who differ in N_i, regardless of the weight of these ties), divided by the total number of dyads of agents who differ in the social distinction (regardless of whether they have already interacted or not). With this approach, the interactions between two group members who differ in N_i provides only a fraction of the information that is potentially available for evaluating competence differences between members of the different categories in larger groups. Accordingly, if only two group members who differ in N_i have interacted so far, the value of *comp* will be low in groups larger than the dyad. However, its value increases as the number of such interactions increases. It reaches its maximum when all members of the two categories in the group have interacted at least once with each other.

We capture the consistency of the observed interaction structures with the measure *cons* ($-1 \leq cons \leq 1$). This measure is based on the interactions occurring between agents who differ in the social distinction. It assesses whether agents who belong to category A appeared more often in the higher or lower competence role in their interactions with agents who belong to category B. More technically, we model *cons* as

$$cons_t = \frac{\#b_{ij,t}^{A-} - \#b_{ij,t}^{A+}}{\#b_{ij,t}^{A-} + \#b_{ij,t}^{A0} + \#b_{ij,t}^{A+}}, \tag{2.3}$$

where $\#b_{ij}^{A-}$ and $\#b_{ij}^{A+}$ are the number of behavior interchange patterns/ties in which agents who belong to the category $N_i = A$ appear in the lower $(-)$ or higher $(+)$ competence role in their interactions with members of the category $N_i = B$ (as indicated by the directions of the ties between them); $\#b_{ij}^{A0}$ represents behavior interchange patterns which are balanced, so that both agents appear similarly competent. The closer *cons* comes to -1, the more often members of the category $N_i = A$ appear in the higher competence role; the closer it comes to 1, the more often members of category $N_i = B$ appear in the higher competence role.

Together *comp* and *cons* determine how strongly the structure of behavior interchange patterns in the group supports a status belief. We express this support with the measure r ($-1 \leq r \leq 1$), which relates to *comp* and *cons* in the following way:

$$r_t = \frac{r_{t-1} + (comp_t \times cons_t)}{1 + comp_t}. \tag{2.4}$$

Eq. (2.4) implies that r approaches its minimal or maximal value only when the structure of behavior interchange patterns is maximally consistent ($cons = -1$ or $cons = 1$) and maximally comprehensive ($comp = 1$). When $r = -1$, the observed structure maximally supports the belief that members of category $N_i = A$ are more competent than members of category $N_i = B$. When $r = 1$, the observed structure maximally supports the belief that members of category $N_i = B$ are more competent than members of category $N_i = A$. Note that Eq. (2.4) creates some time lag in the effect that observed behavior interchange patterns have on r. This implements the notion that when a particular status belief has been supported for some time, new information that contradicts it might initially be conceived as a merely coincidental deviation from well-established hierarchical structures (cf. Ridgeway, 2000).

Finally, there is a chance that agents acquire (and maintain) a status belief when the observed structure of behavior interchanges patterns sufficiently supports it. We assume that agents perceive a given belief as sufficiently supported when the value of r crosses the threshold c (with $0 < c \leq 1$), either in the negative or positive direction. For example, when at time t the value of r is smaller than or equal to $-c$, then the belief $S_i = A$ is sufficiently supported and agents who currently hold no status belief acquire this belief with probability a (with $0 < a \leq 1$). Yet, when at time t the value of r is larger than $-c$, then the belief $S_i = A$ is not sufficiently supported and agents who currently hold this belief lose it with probability l ($0 < l \leq 1$). Similarly, when r is larger than or equal to c, then agents who currently hold no status belief adopt the belief $S_i = B$ with probability a; when r is smaller than c, agents who currently hold this belief lose it with probability l. This implies that agents who hold a status belief that is not sufficiently supported anymore always need to make the transition through $S_i = O$ before they can acquire a new belief.[7]

2.3.5 The temporal ordering of interactions

In our model, group interaction takes place in iterations that consist of five steps that emulate the cycles shown in Figure 2.1:

(1) Update the performance expectations of all agents.
(2) Select a sender and a receiver of a suggestion.
(3) Determine the reaction of the receiver.
(4) Update behavior interchange patterns.
(5) Update status beliefs of all agents.

In the basic interaction model, the outcome of step (4) at t is the basis of step (1) at $t + 1$. In the extended interaction model, the outcomes of steps (4) and (5) at t are the basis of step (1) at $t + 1$. In the random interaction model, the outcomes of steps (4) and (5) do not feed back into step (1). We provide a description of the simulation process in pseudo-code in the appendix

[7] This approach to modeling changes in status beliefs is similar to the approach used by Mark et al. (2009). Note that agents always perceive the observed structure of behavior interchange patterns in the same way, but that this does not necessarily imply that they always hold the same status belief. Instead, belief acquisition is a stochastic process, in which two agents might or might not acquire the same belief given the same observation of behavior interchange patterns.

to this chapter (Section 2.6.2).

2.4 Computational Experiments

We aimed to assess the proposition that task focused interaction in small groups has the tendency to create consistent hierarchical differentiation between members of different social categories and thereby leads to the emergence of status beliefs, even in groups larger than dyads. We assessed this proposition in two experiments. In the first (main) experiment, we assessed whether status construction processes can lead to the emergence of consistent hierarchical differentiation and status beliefs under realistic interaction conditions. We also assessed how emergence is affected by group size, the duration of group interaction, and the possibility that status beliefs affect performance expectations in the context in which they were acquired. In the second experiment, we conducted sensitivity analyses in which we aimed to assess how much model outcomes depend on the exact selection of parameter values.

In all experiments, we focused on groups of sizes $I = 2$, $I = 4$, $I = 6$, $I = 8$, and $I = 10$. The members of these groups were equally divided into the two categories $N_i = A$ and $N_i = B$ (i.e. $I^A = I^B = .5I$). Initially no agent held a status belief (i.e. all $S_i = O$) and no behavior interchange patterns were established between them. In real life, groups might interact over varying time frames. We let agents interact for 2,000 iterations. This seemed long enough to emulate groups that in real life would interact over a long period. Yet, to be able to inspect developments over shorter time frames, we recorded outcomes after each iteration.

In the first experiment, we fixed the parameters that govern the concentration of interactions among higher status group members (γ) and the effect that status differences have on the acceptance and rejection of suggestions (δ) to the values 2.5 and 1 respectively. In the random interaction model and the basic interaction model this parameterization creates interaction conditions in line with our theoretical arguments and observations in empirical research (for examples see J. W. Balkwell, 1991a; Skvoretz & Fararo, 1996). That is, with this parameterization, differences in expectation standings among group members lead to differences in the probability with which they will be the initiator or receiver of a suggestion, to the benefit of individuals with higher expectation standings. The suggestions of individuals with higher expectation standings are more likely to be accepted than suggestions of individuals with lower expectation standings. We had no primary interest in the effects of the threshold parameter (c), the probability that agents acquire beliefs (a), and the probability that they lose beliefs (l). We therefore fixed these parameters at the intermediate value of $c = a = l = .5$. We focused on three outcomes and compared them across all three model versions (i.e. random interaction model, basic interaction model, and extended interaction model). First, we assessed the extent of consistent hierarchical differentiation between members of different social categories with the absolute value of *cons*. Second, we assessed the stability of consistent hierarchical differentiation over time by the number of times the value of *cons* changed its sign during group interaction (i.e. how often *cons* changed from $cons \leq 0$ to $cons > 0$ or from $cons \geq 0$ to $cons < 0$). Third, we assessed the overall tendency for status beliefs to emerge with the largest share of group members that held the same status belief (i.e. the largest set of agents

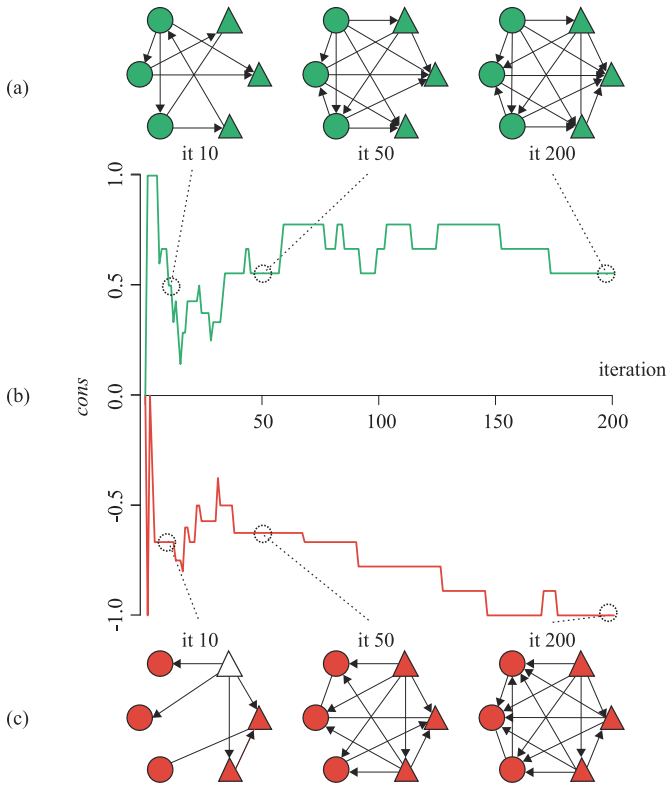

Figure 2.2 Development of consistency of hierarchical differentiation (*cons*) in two exemplary simulation runs in the extended interaction model over 200 iterations. Parameter setting: $I = 6$, $I^A = I^B = .5I$, $\gamma = 2.5$, $\delta = 1$, $c = a = l = .5$. Triangles and circles represent agents for which $N_i = A$ and $N_i = B$ respectively. Red, white, and green coloring of agents represent $S_i = A$, $S_i = O$, and $S_i = B$ respectively. A directed tie between agents indicates that a behavior interchange pattern (b_{ij}) had been established, in which the source appears in the higher competence role and the sink appears in the lower competence role; undirected ties indicate balanced interactions. Panels (a) and (c): snapshots of behavior interchange patterns; panel (b): level of consistent hierarchical differentiation between members of different social categories.

with the same state on S_i that is $S_i \neq O$).

In the second experiment, we first tested how variation in the parameters γ and δ affects model outcomes. We only examined this for the basic interaction model and the extended interaction model, given that these parameters have no effect on interactions in the random interaction model. Subsequently, we assessed how variation in the parameters c, a, and l affects the outcomes of the extended interaction model, given that this is the only model in which they can affect the interactions among agents.

In order to convey a better understanding of the dynamics that our model generates, we start with presenting the outcomes of two exemplary simulation runs. For these runs, we used the extended interaction model to illustrate the full range of dynamics that can occur.

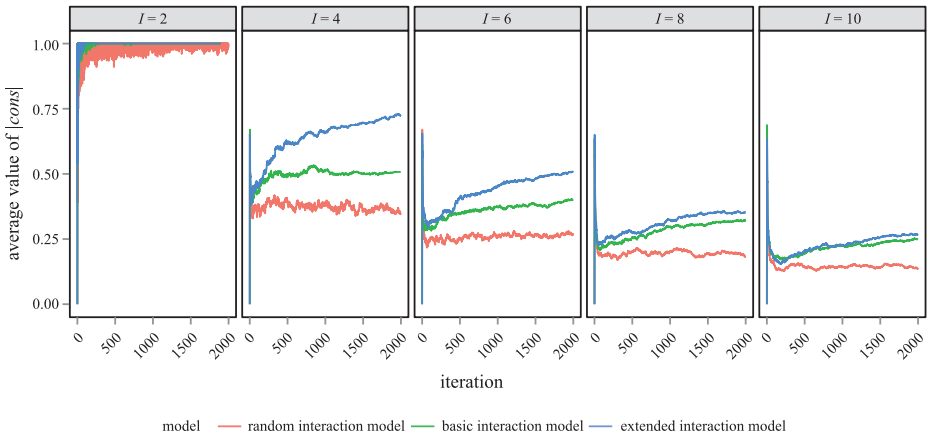

Figure 2.3 Average consistency of hierarchical differentiation (average value of $|cons|$) for different group sizes (I) in all model versions over 2,000 iterations. Parameter setting: $I^A = I^B = .5I$, $\gamma = 2.5$, $\delta = 1$, $c = a = l = .5$. Averages are based on 200 independent simulation runs per condition.

2.4.1 Exemplary simulation runs

Figure 2.2 shows the outcome of two simulation runs that ended with some level of consistent hierarchical differentiation between the members of the two categories. In both runs, there were six group members who interacted for 200 iterations. The trace plot in panel (b) shows the development of consistent hierarchical differentiation between members of the two categories (*cons*) over time. Panels (a) and (c) show snapshots of the structure of behavior interchange patterns that developed in the two groups.

After the first ten iterations of the first run (shown in panel (a)), one member of category B appeared unambiguously more competent in its interactions with two members of category A. By contrast, other members of category B and members of category A appeared more, less, and equally competent in interactions with members of the respective other category. As the trace plot in panel (b) shows, an initial advantage for members of category B led to a high level of consistency. This consistency decreased when some behavior interchange patterns became established in which members of category A appeared more or equally competent as members of category B. However, the initial advantage of members of category B induced a corresponding status belief in some group members. These beliefs fed back into interactions, so that by iteration 200 more comprehensive structures had become established that still supported the belief $S_i = B$.

In the second run (shown in panel (c)), by iteration 10, the structure of behavior interchange patterns was less mixed than in the first run and was to the advantage of members of category A. Over time, this initial advantage became solidified and stronger.

The outcomes of these exemplary simulation runs show that task focused interaction can

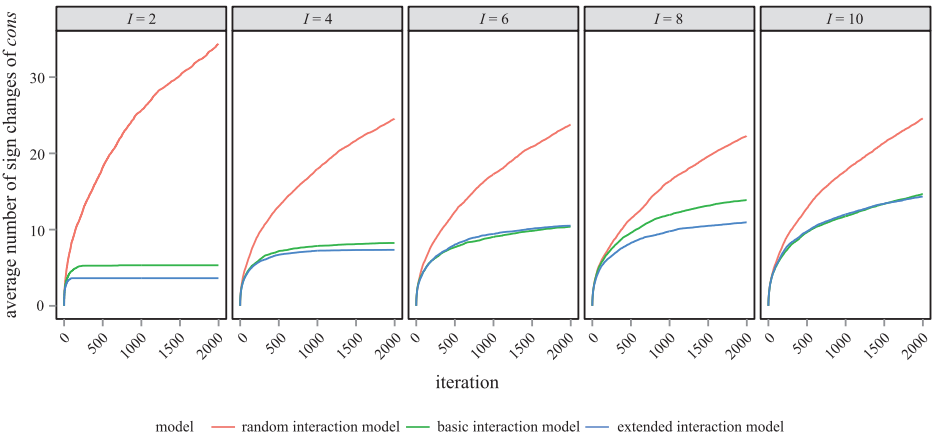

Figure 2.4 Average number of changes in the sign of *cons* for different group sizes (I) in all model versions over 2,000 iterations. Parameter setting: $I^A = I^B = .5I$, $\gamma = 2.5$, $\delta = 1$, $c = a = l = .5$. Averages are based on 200 independent simulation runs per condition.

over time lead to the creation of stable hierarchical structures. These structures can be aligned with differences in a social distinction among group members. Our computational experiments enabled us to assess how likely this is to happen and to assess whether this likelihood depends on group size, time frame, and on the version of the model that is used.

2.4.2 Outcome of main experiment

Figures 2.3 to 2.5 show the outcomes of our computational experiments that aimed at assessing the emergence of consistent hierarchical differentiation and status beliefs based on realistic interaction probabilities. The figures suggest that the behavioral processes that the basic interaction model and the extended interaction model implement tend to induce consistent hierarchical differentiation between members of different social categories and this differentiation leads to the emergence of status beliefs. This tendency is stronger in smaller groups and in the early and late phases of group interaction. However, especially for larger groups, the behavioral principles that the basic interaction model and the extended interaction model implement make an important difference. On average in larger groups, the random interaction model seldom leads to belief emergence. The basic interaction model and the extended interaction model, by contrast, generate substantial amounts of belief emergence.

To illustrate the foregoing results, consider first the relation between group size and consistent hierarchical differentiation shown in Figure 2.3. Increasing group size beyond size two had a strong negative effect on the average level of consistent hierarchical differentiation in all models. This negative effect was strongest in the random interaction model, followed by the basic interaction model, and the extended interaction model. In groups larger than dyads, the average level of consistent differentiation was initially higher in the extended interaction

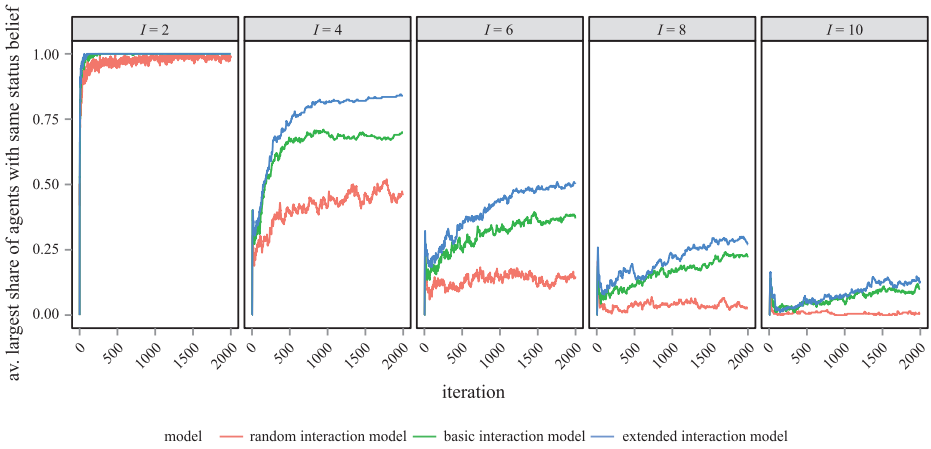

Figure 2.5 Average largest share of agents with the same status belief ($S_i = A$ or $S_i = B$) for different group sizes (I) in all model versions over 2,000 iterations. Parameter setting: $I^A = I^B = .5I$, $\gamma = 2.5$, $\delta = 1$, $c = a = l = .5$. Averages are based on 200 independent simulation runs per condition.

model than in the basic interaction model, but this difference decreased as group size increased. The difference disappeared almost completely for groups of size 10.

The generally negative effect of group size on the level of consistency can be attributed to the fact that larger groups have a larger possibility for contradictory interactions among members of different categories. Additionally, status accumulation tends to be weaker than in smaller groups. The reason is that in larger groups interactions are often spread over a larger number of individuals. This makes it less likely that few, highly dominant actors emerge who might strongly influence patterns of differentiation to the benefit of their own category. This is illustrated by Figure 2.4, which shows that the average number of sign changes in *cons* tended to be higher in larger groups. This indicates that the hierarchical structures that emerge in larger groups tend to be less stable than in smaller groups.

The convergence of the outcomes of the basic interaction model and the extended interaction model with increasing group size can be attributed to the fact that in larger groups status beliefs contribute relatively less to performance expectations. In a group of size four, for example, a single individual can appear in the higher competence role in up to three behavior interchange patterns. In a group of size ten, by contrast, this number increases to 9. Given the attenuation effect implemented in Eq. (2.1), the relative amount of information that status beliefs add to performance expectations in groups of size ten therefore tends to be lower than in groups of size four. Status beliefs thus tend to have less effect on hierarchy formation in larger groups than in smaller groups.

Figure 2.3 shows that there was an initial peak in consistency in the early phases of interactions in groups larger than two. In the basic interaction model and the extended interaction model, this peak was followed by a decrease and subsequent increase in consistency. In the random interaction model, the peak was followed by a decrease that led to a

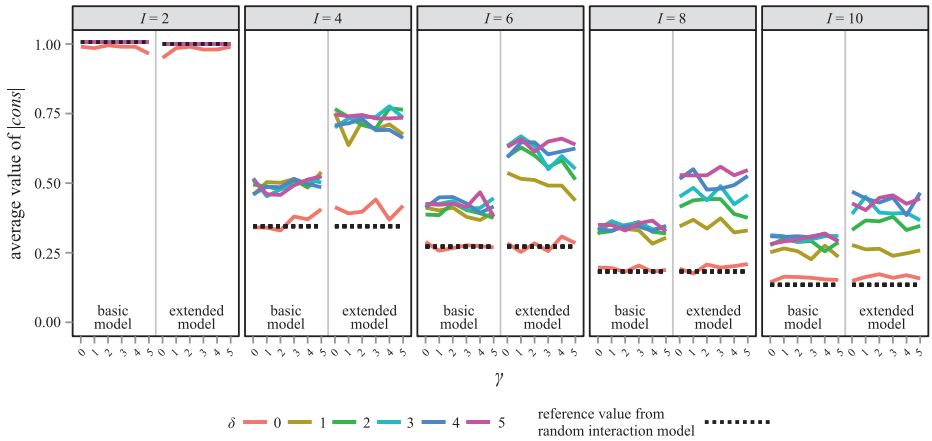

Figure 2.6 Average consistency of hierarchical differentiation (average value of $|cons|$) for different group sizes (I), different levels of concentration of interactions among higher status group members (γ), and different levels of the effect that status differences have on the acceptance and rejection of suggestions (δ) in the basic interaction model and the extended interaction model after 2,000 iterations. Parameter setting: $I^A = I^B = .5I$, $c = a = l = .5$. Averages are based on 200 independent simulation runs per condition. The dotted line provides the average outcome of the random interaction model after 2,000 iterations in the main experiment as a reference value.

comparatively stable, low value of consistency. The initial peak that occurred in all models can be explained by the fact that in the early phases of group interaction, only few group members will have interacted with each other. This leaves little room for interaction patterns that might contradict initial differentiation between members of the two categories. The longer the group interacts, however, the more likely it becomes that such contradicting information arises. The subsequent increase in consistency after the initial drop in the basic interaction model and the extended interaction model is due to the fact that in these models over time status accumulation processes can occur. These processes tend to reinforce any slight advantage for one category and thus contribute to the consistency of observed behavior interchange patterns. In the random interaction model no such reinforcing processes exist and the average level of consistency thus tends to be low after some interactions have taken place.

Note that across model versions the level of consistent hierarchical differentiation was especially high in dyads. However, the random interaction model had more fluctuation in this outcome over time than the basic interaction model or extended interaction model. The generally high level of consistency across model versions can be explained given that in groups of two any hierarchical differentiation is necessarily fully consistent with differences in the social distinction. The fluctuation in the random interaction model is because interactions occur at random, meaning that the history of interactions between group members will sometimes be balanced. This implies that occasionally there is no hierarchical differentiation between them and this tends to suppress the average absolute value of *cons* across simulation runs. The processes that the basic interaction model and the extended interaction model implement, by

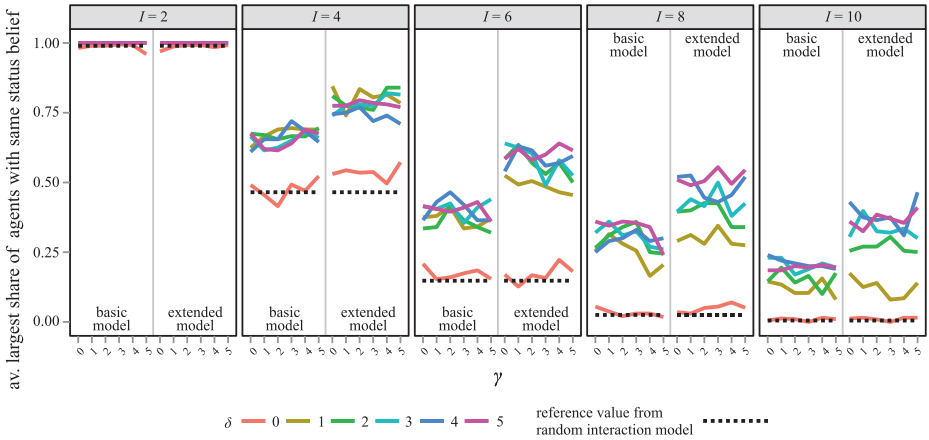

Figure 2.7 Average largest share of agents with the same status belief ($S_i = A$ or $S_i = B$) for different group sizes (I), different levels of concentration of interactions among higher status group members (γ), and different levels of the effect that status differences have on the acceptance and rejection of suggestions (δ) in the basic interaction model and the extended interaction model after 2,000 iterations. Parameter setting: $I^A = I^B = .5I$, $c = a = l = .5$. Averages are based on 200 independent simulation runs per condition. The dotted line provides the average outcome of the random interaction model after 2,000 iterations in the main experiment as a reference value.

contrast, lead to more stability in hierarchical differentiation, even in groups of size two.

Consider next the average largest share of agents that hold a status belief, shown in Figure 2.5. The results parallel the results for the level of consistent hierarchical differentiation shown in Figure 2.3, given that belief emergence is linked to the level of consistent hierarchical differentiation. That is, the largest share of agents who hold a status belief shortly peaked in the early phases of the simulation process. In the case of the random interaction model, this peak was followed by a decrease that, over time, leveled off to a stable, low value. In the cases of the basic interaction model and the extended interaction model, by contrast, the peak was followed by a temporary decrease and a subsequent increase. Over time, the increase leveled off to a stable value that was higher than in the random interaction model. The most striking finding is that in larger groups, the random interaction model on average hardly led to the emergence of status beliefs. By contrast, in the basic interaction model and the extended interaction model, there was a substantial probability that agents acquire status beliefs, especially in later stages of group life. This implies that, given the parameterization chosen here, the behavioral process that these models implement make the emergence of status beliefs more likely, especially in larger groups.

2.4.3 Outcome of sensitivity analysis

Figures 2.6 and 2.7 show the outcome of our sensitivity analysis, focused on the parameters that govern the concentration of interactions among higher status group members (γ) and the

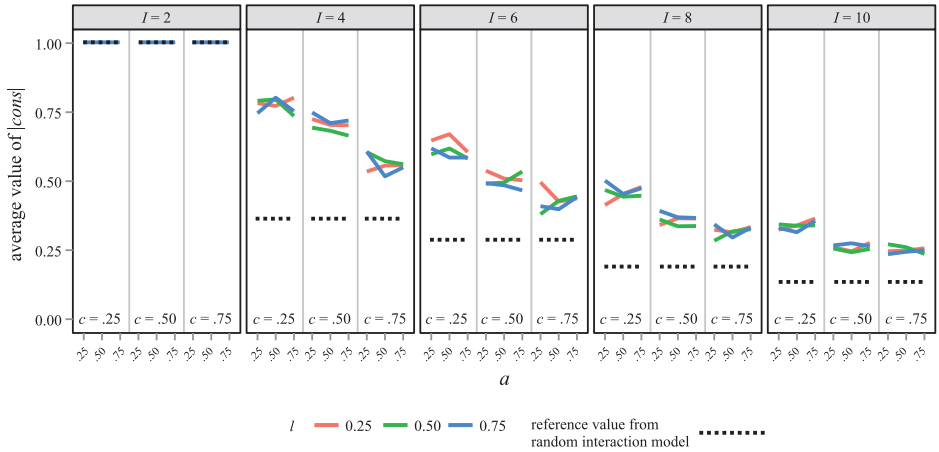

Figure 2.8 Average consistency of hierarchical differentiation (average value of $|cons|$) for different group sizes (I), different levels of the threshold for belief acquisition (c), and different probabilities that belief acquisition (a) or loss (l) occur in the extended interaction model after 2,000 iterations. Parameter setting: $I^A = I^B = .5I$, $\gamma = 2.5$,and $\delta = 1$. Averages are based on 200 independent simulation runs per condition. The dotted line provides the average outcome of the random interaction model after 2,000 iterations in the main experiment as a reference value.

effect that status differences have on acceptance and rejection of suggestions (δ). For brevity, we show only the average absolute level of consistency of hierarchical differentiation and the largest share of agents with the same status belief after 2,000 iterations. The results in terms of consistency (Figure 2.6) and belief emergence (Figure 2.7) are very similar, because belief emergence is linked to consistency for a given set of values for c, a, and l. Therefore, we discuss only the results for the consistency of hierarchical differentiation in detail. For illustrative purposes, we also show the outcome of the random interaction model after 2,000 iterations. Note that in this model interaction dynamics cannot be affected by the parameters γ and δ. Therefore we use the same comparison value across different conditions given a certain group size I.

Figure 2.6 suggests that the parameters γ and δ have little effect on model outcomes in dyads. Only when δ was 0, the average absolute level of *cons* tended be somewhat lower than 1. The reason is that in this case, differences in expectation standings between group members cannot affect the likelihood with which they will accept/reject each other's suggestions. This means that the outcome of their interactions is determined completely at random. Consequently, the behavior of the basic interaction model and the extended interaction model becomes similar to the behavior of the random interaction model. Figure 2.6 suggests that this similarity also occurs in groups larger than two. That is, when $\delta = 0$, the outcomes of the basic interaction model and the extended interaction model hardly differed from the outcomes of the random interaction model. The value of γ had no effect on this similarity. It should be noted though that such a parameterization would be inconsistent with the theoretical assumptions that we want to

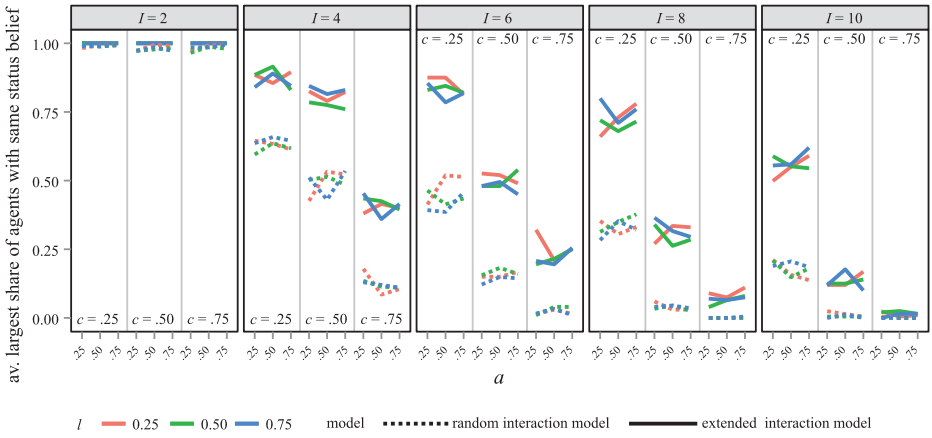

Figure 2.9 Average largest share of agents with the same status belief ($S_i = A$ or $S_i = B$) for different group sizes (I), different levels of the threshold for belief acquisition (c), and different probabilities that belief acquisition (a) or loss (l) occur in the random interaction model and the extended interaction model after 2,000 iterations. Parameter setting: $I^A = I^B = .5I$, $\gamma = 2.5$, and $\delta = 1$. Averages are based on 200 independent simulation runs per condition.

implement with this model, given that under this condition differences in expectation standings among group members do not affect the likelihood with which their suggestions will be accepted.

When the value of δ was larger than 0, the basic interaction model and the extended interaction model created higher levels of consistency than the random interaction model. The difference between the basic interaction model and the extended interaction model depended on how much δ was larger than 0, especially in larger groups. The potential reasons for this are the weaker tendency toward status accumulation in larger groups and the relatively smaller differences that status beliefs create in expectation standings in such groups. Under such conditions, even small status differences (as induced by status beliefs) need to have a strong impact on interactions (i.e. higher values of δ are required) in order to increase consistency.

The value of γ generally seems to have little effect on model outcomes. A possible reason is that values of $\delta > 0$ make it more likely that agents with a status advantage will maintain this advantage in subsequent interactions. Thus, any interaction across the boundary of the social distinction involving status-advantaged and status-disadvantaged actors is likely to bolster existing status differences. Thus, it matters relatively little whether interactions are concentrated among higher status group members.

Figures 2.8 and 2.9 show the effect that variation in the threshold parameter (c) and in the parameters that govern the probability of belief acquisition (a) and loss (l) had on model outcomes. In the case of consistency (Figure 2.8) we also show the outcome of the random interaction model after 2,000 iterations from the main experiment. Again, this comparison value

is stable across conditions for a given group size I, given that c, a, and l cannot affect interactions in this version of the model. In the case of the largest share of agents with the same status belief (Figure 2.9), by contrast, we show comparison values from simulation runs based on the random interaction model at different values of c, a, and l. This is because these parameters can affect belief emergence in this model, even if beliefs cannot affect interactions.

The results in Figure 2.8 suggest that only c has an effect on model outcomes in terms of consistent hierarchical differentiation, by reducing the average absolute level of *cons*. The reason is that when c is high, the consistency of hierarchical differentiation in a group needs to be high before agents can acquire status beliefs. When a group has reached this state, there is little room left for status beliefs to contribute to even higher levels of consistency. Similarly, the results shown in Figure 2.9 suggest that that only c had an effect on model outcomes in terms of belief emergence. Generally, the more consistent hierarchical differentiation needs to favor one of the two categories before agents can acquire (or maintain) status beliefs, the less likely beliefs are to emerge in both the random interaction model and the extended interaction model. Yet, at a given level of c, the processes that the extended interaction model implements still made belief emergence more likely than in the random interaction model, unless both group size and the threshold parameter were comparatively large/high (i.e. $I = 10$ and $c = .75$).

Together, the results of our sensitivity analysis suggest that our main findings hold over a large area of the parameter space. If δ is larger than 0, the basic interaction model and the extended interaction model tend to create higher levels of consistency than the random interaction model. The larger δ becomes, the stronger this tendency becomes in the extended interaction model compared to the basic interaction model, especially in larger groups. Higher values of c tend to decrease the levels of consistency and belief emergence in the extended interaction model, but still this model tended to show higher average levels of both outcomes than the random interaction model for most parameter combinations.

2.5 Discussion and Conclusion

This chapter contributes to research on the social construction of status characteristics by investigating how interaction in task focused groups larger than dyads can create conditions necessary for the emergence of status beliefs. Earlier research suggests that the observation of consistent hierarchical differentiation between members of two different social categories can create the belief that members of one category are more competent than members of the other category, even if only by accident. Based on research in the expectation states framework, we developed an agent-based computational model that enabled us to examine the conditions under which task focused interaction might spontaneously create such consistency and thereby might lead to the emergence of stats beliefs.

Our computational experiments suggest that small group interaction might spontaneously create consistent hierarchical differentiation between members of different social categories, even in groups larger than dyads. This tendency might exist even when status beliefs do not affect performance expectations in the contexts in which they emerged. Moreover, the emergence of consistent differentiation might be more likely in smaller groups than in larger

groups, and in groups that interact for a very short or very long time. Finally, as groups become larger, the reinforcing effect that newly created status beliefs can have on consistent hierarchical differentiation might become weaker.

Our study shows that task focused interaction in small groups might be a potent force in the creation of status beliefs, also if groups contain more than two members. Future research can build on and extend our model in several ways. First, we did not investigate the mechanisms related to status beliefs crossing group boundaries. Future research might investigate how the processes involved in the creation of status beliefs, as presented here, relate to their diffusion throughout society. To this end, the simulation model could be extended to include more agents who can join/leave groups of different sizes for various durations.

Second, in line with existing research in status construction theory, we focused on social distinctions that create two categories of individuals. In real life, group members might be differentiated by social distinctions that create more than two categories and this might increase the complexity of the interactional dynamics that unfold. Extending our model to allow for more than two categories could provide researchers with a lever to study the implications of this additional complexity. However, it is important to note that to date there is little knowledge of the cognitive processes that underlie status construction processes in the presence of more than two categories. Including the notion that there can be more than two categories should therefore proceed in close interaction with empirical research.

Third, similar to earlier models of hierarchical differentiation in small groups (e.g., Skvoretz & Fararo, 1996), in our model a single interaction between two group members can be sufficient to establish a behavior interchange pattern between them and thereby can potentially lead to the formation of status beliefs. It is an empirical question how many interactions between two individuals it takes before participants and observers actually perceive competence differences between them. Future research could conduct detailed empirical experiments to directly calibrate this (and other) model aspect(s). Yet, since earlier models using similar assumptions generated hierarchical structures congruent with empirical data (Skvoretz & Fararo, 1996), this simplifying assumption seems sufficient for our purposes.

Finally, a central outcome of interest in earlier work on hierarchy formation in small groups was the formation of transitive hierarchies (Skvoretz & Fararo, 1996; Skvoretz et al., 1996). In our work, we explored the possibility that status beliefs might affect the interactions in the very group context in which they had been acquired. Future research might provide interesting new insights into how this possibility might affect the formation of fully transitive hierarchies in groups whose members are differentiated in a salient social distinction. It seems likely that in such groups, the reinforcing effects of status beliefs, once they have emerged, also facilitate the emergence of fully transitive structures

2.6 Appendix to Chapter 2

2.6.1 Formalizing performance expectations

In empirical research, formal representations of the formation of performance expectations are based on graph representations in which individuals are differentially linked to task

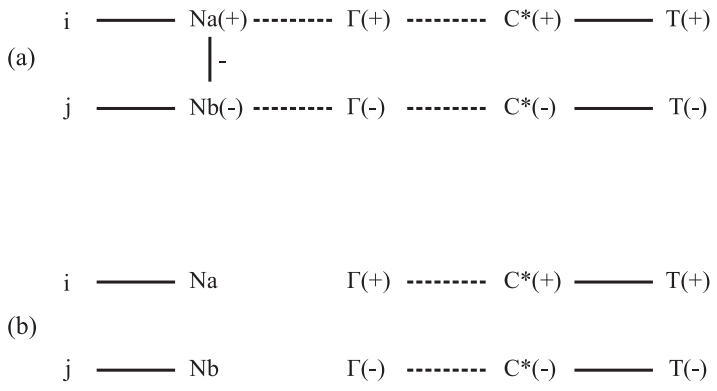

Figure 2.10 Graph representations of status structures in two-person group task situation. Individuals are represented as i and j. There is a nominal characteristic N with two states (N_a and N_b). Panel (a): individual i's point of view; i perceives N as a status characteristic so that it is connected to generalized performance expectations Γ which are connected to differences in the task ability C^* that is required for the task T; panel (b): individual j's point of view; j does not perceive N as a status characteristic.

outcomes. Such representations were introduced by Berger et al. (1977); Fisek et al. (1991) subsequently incorporated behavior interchange patterns, and Ridgeway (2000) incorporated elements of status construction. The notation we use here is slightly different from the main part of this chapter to facilitate comparison with the original formulations.

Panels (a) and (b) of Figure 2.10 show an elementary group task situation that includes two persons i and j who differ in their status beliefs. The task is represented by T and its possible outcomes, success ($T(+)$) and failure ($T(-)$). To achieve success, the task requires one instrumental ability (C^*), whereas group members can either possess the high state ($C^*(+)$) or the low state ($C^*(-)$) of this ability (e.g., high vs. low mathematical skills in the case of a math problem). The relevance of C^* for T is indicated by a tie between their different states, so that the high state of C^* is connected to success and its low state is connected to failure. There is a nominal characteristic (N) that distinguishes group members into two categories (N_a and N_b) which can be thought of as gender (man/woman) or skin color (white/black). Panel (a) shows the situation from i's point of view; i holds the belief that members of category N_a are more competent than members of category N_b (resulting in corresponding perceptions of highly, i.e. $N_a(+)$, and lowly, i.e. $N_b(-)$, evaluated states of the characteristic). For i, $N_a(+)$ and $N_b(-)$ thus induce differences in generalized performance expectations (Γ) that connect both persons via C^* to task outcomes. However, as illustrated in panel (b), j does not believe that N signifies differences in competence. For j, N_a and N_b are thus neither evaluated differently, nor connected to the task.

Fisek et al. (1991) incorporated into this behavior interchange patterns, as illustrated in panels (a) and (b) of Figure 2.11. Imagine that i and j already worked for some time on the common task and that during their interactions j consistently accepted i's suggestions, whereas

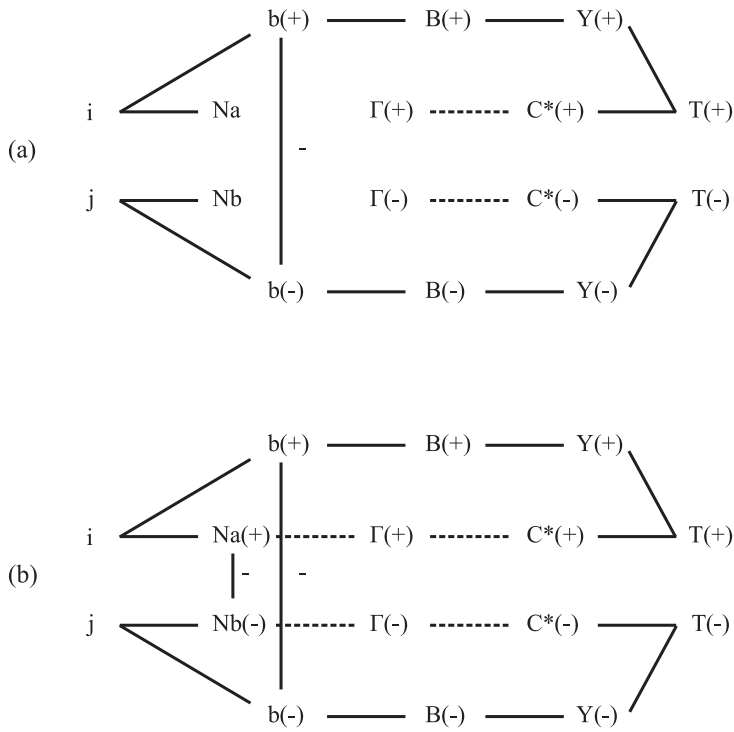

Figure 2.11 Graph representations of status structures in two-person group task situations in which behavior interchange patterns b have been activated. Panel (a): individual i appears in the superior role ($b(+)$) in her interactions with j; panel (b): the observation that i appears in the superior role induces in i and j the perception that N is connected to T, given that i and j differ in N.

i consistently rejected j's suggestion. This observation activates in both individuals the perception of a behavior interchange pattern (b) in which i holds the positively evaluated state ($b(+)$), whereas j holds the negatively evaluated state ($b(-)$). These states activate like-signed status typifications ($B(+)$, i.e. leader, and $B(-)$, i.e. follower) that connect both individuals via abstract task abilities (Y) to task outcomes.

Finally, as illustrated in panel (b) of Figure 2.11, Ridgeway (2000) suggested that the link between different states of N and Γ can become activated by the observation of behavior interchange patterns between individuals who differ in N. In Figure 2.11, this is the case, given that i, who is N_a, holds the positive element of a behavior interchange pattern with j, which is N_b. This potentially induces in both i and j the belief that individuals with N_a are generally more competent than individuals with N_b. In total three different beliefs are possible, leading to the following evaluations of N: N_a/N_b, $N_a(+)/N_b(-)$, $N_a(-)/N_b(+)$.

Berger et al. (1977) developed a method which can estimate from graph structures the

relative performance expectations that group members have for each other. The first step consists of counting the number of positive and negative paths of various lengths (l) that connect individuals to task outcomes. Path signs are determined by multiplication of the signs of all ties that link a given person to task outcomes and the sign of the task outcome to which it is connected, whereas all ties are assumed positive unless they are explicitly negative. In panel (a) of Figure 2.10, i is connected to T by two positive paths of length 4 and 5, whereas j is connected to T by two negative paths length 4 and 5. Note that there is a negative dimensionality tie between N_a and N_b.

In a second step, these paths aggregate to performance expectations for, for instance, actor i (e_i) by the following rule (cf. Berger et al., 1977; Fisek et al., 1991):

$$e_i = e_i^+ + e_i^-, \tag{2.5}$$

with

$$e_i^+ = 1 - [1 - f(l)] \cdots [1 - f(n)] \tag{2.6}$$

and

$$e_i^- = -\left\{1 - \left[1 - f(l')\right] \cdots \left[1 - f(n')\right]\right\}. \tag{2.7}$$

In Eq.s (2.5), (2.6), and (2.7), e_i^+ and e_i^- represent the combined sets of positive and negative paths. The precise numerical values with which paths of different length enter (2.6) and (2.7) are determined by the function $f(l)$. Although several functional forms are specified in the literature, the values they predict for paths of a given length differ only marginally. All functional forms have in common that longer paths contribute less to the formation of performance expectations than shorter ones, and this diminishing effect increases the longer the paths become. Paths longer than 6 are generally assumed to provide no performance relevant information for individuals and are therefore neglected. We rely here on the functional form suggested by Balkwell (1991b), because the values it predicts are in good accordance with empirical data. Thus, we assume that $f(4) = .150380$, and $f(5) = .049779$. In order to obtain Eq. (2.1), it is helpful to note that Eq. (2.6) and Eq. (2.7) are equivalent to

$$e_i^+ = 1 - [1 - f(2)]^{l2_i^+}[1 - f(3)]^{l3_i^+} \cdots [1 - f(L)]^{lL_i^+} \tag{2.8}$$

and

$$e_i^- = -\left\{1 - [1 - f(2)]^{l2_i^-}[1 - f(3)]^{l3_i^-} \cdots [1 - f(L)]^{lL_i^-}\right\}, \tag{2.9}$$

where lL_i^+ and lL_i^- indicate the number of positive and negative paths of a given length (J. W. Balkwell, 1991b). Given that we only consider nominal characteristics and behavior interchange patterns, the only paths that can be obtained are of the lengths 4 and 5. We can thus

reduce the foregoing equations to

$$e_i^+ = 1 - [1 - f(4)]^{l4_i^+}[1 - f(5)]^{l5_i^+} \tag{2.10}$$

and

$$e_i^- = -\left\{1 - [1 - f(4)]^{l4_i^-}[1 - f(5)]^{l5_i^-}\right\}. \tag{2.11}$$

Substituting Balkwell's (1991b), path weights into these equations and substituting the resulting equations for e_i^+ and e_i^- into Eq. (2.5), we obtain

$$e_i = 1 - [1 - .150380]^{l4_i^+}[1 - .049779]^{l5_i^+} - \left\{1 - [1 - .150380]^{l4_i^-}[1 - .049779]^{l5_i^-}\right\}, \tag{2.12}$$

which can be simplified to

$$e_i = -.84962^{l4_i^+}.950221^{l5_i^+} + .84962^{l4_i^-}.950221^{l5_i^-}. \tag{2.13}$$

Finally, in our model, a connection to a positive status element (i.e. $N(+)$ and $b(+)$) always induces one positive path of length 4 and one positive path of length 5; a connection to a negative status element (i.e. $N(-)$ and $b(-)$) always induces one negative path of length 4 and one negative path of length 5. Consequently, $l4_i^+ = l5_i^+$ and $l4_i^- = l5_i^-$. It is therefore sufficient to simply count the number of positive ($\#pos_i$) and negative status elements ($\#neg_i$) to which a given i is connected (i.e. the number of $N(+)/b(+)$ or $N(-)/b(-)$ to which a tie from i exists) and substitute the resulting numbers into the following equation:

$$e_i = .807327^{\#neg_i} - .807327^{\#pos_i}. \tag{2.14}$$

When generalized to the case in which each group member can hold a private expectation for each group member that can differ from that of other group members, we obtain Eq. (2.1) in the main part of this chapter. For simplicity, we rounded the value of .807327 to .8.

2.6.2 Pseudo-code

2.6.2.1 Initialization

```
Create agents one at a time.

For each agent, determine the performance expectations eij
that it has for all group members, including itself.

Create variables that store the values of comp, cons, and
r.

Create an auxiliary variable largest_share_of_believers
```

that stores the information about the largest share of agents that hold the same state on S_i which is different from O.

Create an auxiliary variable changes_cons that stores the information about the number of times that *cons* has changed its sign over the course of the simulation. Set the value of changes_cons to 0.

Create an auxiliary variable number_iterations that stores the number of iterations already conducted.
Set the value of number_iterations to 0.

2.6.2.2 *Execution*

While number_iterations $\leq$ max_number_iterations:
{
For each agent, update its performance standing E_i in the group.

For each agent, create a temporary variable $E^{\gamma}{}_i$ that stores the value of E_i, weighted with γ as an exponent.

Randomly select one agent for being interactant_1, with a probability proportional to $E^{\gamma}{}_i$ over all agents.

Randomly select one agent for being interactant_2 from the set of agents that excludes interactant_1, with a probability proportional to $E^{\gamma}{}_i$ over all agents in this set.

For both interactant_1 and interactant_2, create a temporary variable $E^{\delta}{}_i$ that stores the value of E_i, weighted with δ as an exponent.

Randomly select interactant_1 or interactant_2 for appearing in the higher competence role in their interaction, with a probability proportional to $E^{\delta}{}_i$ over both agents; assign the respective other agent the lower competence role.

```
    Update the behavior interchange pattern/tie b_ij
    between interactant_1 and interactant_2, based on
    the outcome of their interaction.

    Calculate comp, cons, and r.

    For each agent, update its status belief S_i.

    For each agent, update the performance expectations
    e_ij it has for all group members, including itself.

    If cons has changed its sign compared to the last
    iteration, increase the value of changes_cons by 1.

    Calculate largest_share_of_believers.

    Report comp, cons, changes_cons, r,
    largest_share_of_believers.

    Increase number_iterations by 1
}
```

Chapter 3

Regional Variation in Status Values: An Explanation Based on Status Construction Theory*

Abstract

Why do the status values of social distinctions, such as gender, age, and ethnicity, often vary widely across geographic regions? Current research argues that regional variation in cultural and institutional factors, such as inheritance practices and modes of production, creates power and resource differences between social categories. These differences, in turn, give rise to status differences. We propose a new mechanism that can generate regional variation in status values, without having to assume variation in related cultural and institutional factors. Our explanation links micro-level mechanisms proposed by status construction theory with macro structural conditions derived from social network research. In status construction theory, interactions between members of different categories can induce beliefs about status differences between the categories. Social network research suggests that such interactions are often clustered spatially and occur more often within than between geographic regions. We argue that the interplay between spatial network clustering and status construction processes can lead to regional variation in status values. We elaborate on this interplay with an agent-based model that we submit to systematic computational experiments to develop testable implications.

*This chapter is co-authored with Andreas Flache and Rafael Wittek and at time of writing was in preparation for submission to a scientific journal.

3.1 Introduction

Status inequality between social categories often varies widely across geographic regions. In the USA, for example, the status disadvantage of women is more pronounced in the South than in the North (Rice & Coates, 1995) and in Turkey, the status of older men is higher in rural than in urban areas (Gilleard & Gurkan, 1987). Status is an important goal in social life (Blau, 1964) and status inequality begets inequality in other areas, such as academic performance (Steele & Aronson, 1995), job attainment (Moss-Racusin et al., 2012), and health (Marmot, 2004). Status inequality has therefore been considered a major source of social inequality (Ridgeway, 2014).

Social scientists have a long-standing interest in explaining why the status that some social distinctions yield varies across geographic regions (e.g., C. Balkwell & Balswick, 1981; Brashears, 2008; Hendrix & Hossain, 1988; Ishii-Kuntz & Lee, 1987; Powers et al., 2003; Sanderson et al., 2005; Stover & Hope, 1984). Existing research has mainly sought the explanation through regional variation in cultural and institutional factors, such as inheritance practices and modes of production. These factors are seen as antecedents of power and resource differences between members of different social categories, which lead to status differentials between the categories. Lee's (1984) explanation of the status effect of age is an example. Lee suggested that regional differences in inheritance practices and residential customs for newly married couples lead to differences in the control and power that older people have over younger people. This ultimately leads to regional differences in the respect and deference that older and younger people receive.

Regional differences in cultural and institutional factors can undoubtedly play an important role in explaining regional differences in status values. However, we suggest that there may be an additional, more elementary mechanism. Drawing on status construction theory (Ridgeway, 1991; Webster & Hysom, 1998) and social network research (e.g., Mok et al., 2007; Wong et al., 2006), we argue that geographical differences in status values may be a consequence of spatially clustered status construction processes. These processes might be sufficient to generate regional variation in status values, even when there is no variation between regions in the cultural and institutional conditions under which these processes unfold.

Status construction theory has been developed within the expectation states framework (Berger et al., 1977), which is a set of theories that focus on the emergence of status differentiation in groups with a collective task focus. Building on this framework, status construction holds that every-day interactional experiences are an important source of status values (Ridgeway, 1991). When individuals meet to achieve joint goals, for example at work, school, or in neighborhood groups, there is a chance that hierarchies of influence and dominance emerge. In these hierarchies, some interactants are perceived as more respected and competent than others. If hierarchical differentiation occurs between members of different social categories and is not challenged, a seemingly valid social reality is created. This can induce observers to believe that category membership signifies differences in respect and competence (Ridgeway & Correll, 2006). That is, they acquire status beliefs, which imbue the distinction with status value that favors one category over the other. Once created, status beliefs tend to

reinforce themselves, because individuals carry them into subsequent interactions in other contexts and treat new interaction partners in line with them. This renders it likely that new hierarchies emerge that support incidentally created beliefs and teach these beliefs to others (Ridgeway et al., 2009; Ridgeway & Erickson, 2000). As a result, status beliefs can emerge and diffuse throughout a population, even in the absence of systematic power and resource differences between members of the different categories (Mark et al., 2009; Ridgeway, 2000).

In line with status construction theory, we focus on face-to-face interactions as a source of status beliefs and thereby of status values. We add the notion that the networks of interaction that exist in larger populations are often spatially clustered. This means that interactions are more likely to occur between individuals who live relatively close to each other, than between individuals who live at larger distance from each other (Faust et al., 1999; Festinger, Schachter, & Back, 1950; Mok et al., 2007; Preciado, Snijders, Burk, Stattin, & Kerr, 2012; Sailer & McCulloh, 2012; Wong et al., 2006). We argue that the behavioral processes that status construction theory describes can create regional variation in status values when spatial network clustering is taken into account. The reason is that spatial network clustering creates dense local interaction structures that can quickly diffuse any incidentally created status belief among the inhabitants of a given geographic region. This may result in a local social reality that renders the belief seemingly consensual. Local consensus, in turn, can ward off potential influence from less frequently occurring interactions with members of other geographic regions in which different beliefs might have emerged. As a result, regional variation in status values can both emerge and persist.

We study the postulated link between spatial network clustering and regional variation in status values with an agent-based computational model (Bonabeau, 2002; Macy & Flache, 2009) of face-to-face interactions in geographically distributed populations. Our model builds on and extends the minimal model of status construction theory developed by Mark et al. (2009). Our work is similar in spirit to this earlier work, but it is also decisively different. Mark et al. showed how the interplay of some of the micro-level mechanisms that status construction theory describes could generate population-wide *consensus* in status values. We show how the mechanisms that status construction theory describes can lead to *diversity*, when they are combined with the macro-level condition of spatially clustered social networks. Agent-based computational modeling is particularly suitable for this purpose, because our argument emphasizes local interactions and heterogeneity among the members of larger populations. Such conditions are often difficult, if not impossible, to study with standard analytical methods (Bonabeau, 2002; Gilbert & Troitzsch, 2005; Gilbert, 2008). For comparability and consistency with earlier (modeling) work in status construction theory, we focus on the basic mechanisms that the theory describes and abstract from other factors that might affect the development of status beliefs. We discuss some of these factors, and their potential implications for future research directions, in the concluding section of this chapter.

To preview results, computational experiments with our model suggest that, at the macro level, increasing spatial network clustering makes it more likely that populations develop regional variation in status values. Our model also highlights that this link crucially depends on a central micro-level assumption of status construction theory. The theory holds that individuals

only acquire and maintain status beliefs when they perceive them as sufficiently consensual in their own social surrounding. We show that when belief acquisition and maintenance require almost perfect consensus, the likelihood of belief emergence decreases. Given that belief emergence is necessary requirement for the formation of actual local consensus on status values, this implies that a stronger need for consensus will suppress the association between spatial network clustering and regional variation of status values.

In the following sections, we first provide an informal outline of the assumptions that underlie our explanation of regional variation in status values. We then develop the agent-based model that we submit to systematic computational experiments. We close the chapter with discussing our findings and their implications for future research.

3.2 The Informal Theory

3.2.1 Behavioral and cognitive assumptions

As indicated in Chapter 2, research in status construction theory has focused on categorical distinctions that create at least two mutually exclusive social categories. These categories are often easy to discern during face-to-face interaction, as is typically the case for gender and race. We follow this tradition also in the current chapter.

The status value of a distinction is determined by the distribution of status value beliefs (or simply *status beliefs*) in a population (Ridgeway, 1991). Status beliefs represent assumptions about the relative esteem and competence and "associate greater social esteem and competence with people in one category than with those from another" (Ridgeway et al., 2009). A distinction has attained status value when the widespread belief exists that members of one category are relatively more respected and competent than members of the other category (Ridgeway & Balkwell, 1997). Gender, for example, has status value in populations in which men are widely believed to be more respected and competent than women. Yet, the status value of a distinction can vary among regionally dispersed subpopulations (Gilleard & Gurkan, 1987; Rice & Coates, 1995). That is, a belief might be more consensual among population members who live in a particular geographic region than in the rest of the population. The beliefs that developed in different geographic regions might even be strictly opposite (e.g., men are more respected and competent than women vs. women are more respected and competent than men). In both cases we speak of regional variation in status values.

Status construction theory argues that interactions between members of different social categories who share collective goals can spontaneously create, reproduce, and diffuse status beliefs. According to the theory, three assumptions are central to this (cf. Mark et al., 2009).[8]

First, the s*tatus hierarchy emergence assumption* holds that small groups quickly develop hierarchical differences in respect and influence, when their members have to collaborate to achieve a collective goal (e.g., Bales, 1970). The reason is that in such contexts, individuals act

[8] Our discussion of assumptions 1 and 2 heavily draws on Mark et al.(2009). Our discussion of assumption 3 also draws on their work but puts stronger emphasis on the importance of perceived consensus in the belief formation process.

"as if one of the[ir] subtasks is to decide who has high and who has low ability at the [collective] task–thus to take advantage of high ability members and not to be misled by low ability members" (Driskell, 1982, p. 232). They therefore search for cues that might signal competence differences. If such cues exist, the group's hierarchy in terms of respect and influence will quickly reflect assumptions about relative competence (Ridgeway, 1991). Competence cues do not always reflect actual competence differences (Webster & Hysom, 1998). Confident behavior, for instance, is often assumed to indicate knowledge and competence. Individuals who act in a confident manner are therefore often perceived as more competent, even when their contributions are qualitatively not different from contributions made by individuals who act less confident (cf. Carli, LaFleur, & Loeber, 1995).

Second, the *status belief effect assumption* holds that in socially differentiated interactions status beliefs affect assumptions about relative competence. For example, when men and women interact in a small group setting and some individuals believe that women are generally more competent than men, they will be more attentive to and accepting of the suggestions of female group members. That is, gender, becomes a competence cue in the eyes of belief-holders. This makes it likely that hierarchies of respect and influence emerge that reflect the belief that females are more competent than males (for an overview of research on this phenomenon see Wagner & Berger, 2002).

Third, the *perceived consensus and status belief change assumption* holds that the observation of hierarchical differentiation between particular individuals from different social categories can induce beliefs about the respectability and competence of members of the categories in general. That is, individuals tend to infer relative competence from hierarchical differentiation (Ridgeway, 2000). When such differentiation is juxtaposed with differences in a social distinction, there is a chance that individuals "misattribute" (Webster & Hysom, 1998, p. 357) apparent competence differences to differences in the characteristic. The likelihood that this happens depends on the consensus in the mutual competence evaluations that individuals perceive (Ridgeway & Correll, 2006; Ridgeway, 2000). Using Ridgeway's words:

> "[... P]eople take on status beliefs from interaction because of the appearance of consensus in a local situation that makes an enacted correspondence between people's nominal differences and [...] competence appear to be a valid social fact. Subsequent encounters that confirm this status belief [...] broaden the appearance of consensus about the status belief. As the appearance of consensus is validated across contexts and actors, the belief becomes part of the actor's accepted social framework." (Ridgeway, 2000, p. 99)

Thus, the observation of hierarchical differentiation in a particular context can create status beliefs because it conveys the impression of consensual agreement in the mutual evaluations of the involved interactants. For these beliefs to be maintained, subsequent encounters with different individuals in different contexts need to sufficiently back up the perceived consensus. Once a belief appears largely consensual, a few deviating experiences are unlikely to undermine it (Ridgeway, 2000).

3.2.2 The spatial structure of interactions

Status construction theory highlights the importance of face-to-face goal-oriented interactions. A large body of research on the structure of social networks suggests that such interactions are constrained by spatial distance. Spatial distance has been found to matter also in the organizational context, in which most every-day goal-oriented interactions take place. For example, spatial distance negatively affects the likelihood that collaboration occurs between individual scientists, companies, and companies and universities (Balland, 2012; Hoekman, Frenken, & Tijssen, 2010; Katz, 1994; Ponds et al., 2007). Similarly, individuals often encounter co-workers who live in the same geographic area (cf. Niles & Hanson, 2003). This can be attributed to limits in the time that most people are willing to commute every day (cf. Rouwendal, 1999).

A social network represents the existence of a relation between individuals, or the fact that interaction takes place between them, by ties. Wong, Pattison, and Robins (2006) summarized properties that such networks often exhibit. The following two are most important for our purpose. First, individuals' time budgets are limited and therefore networks are typically sparse, so that only few of the many possible ties are realized. Second, because networks are sparse and because the interactions that actually take place are constrained by distance, networks often show spatial clustering. This means that there are communities of actors who are highly connected internally, but loosely connected to members of other highly inter-connected communities (Wong et al., 2006).

The effect of distance on the likelihood of interaction can vary across populations. In highly developed countries, with a high density of car ownership and public transportation, it is easier to cover a distance of 10, 100, or more miles than in less developed countries, in which walking is the main mode of transportation for a large part of the population (cf. Mok et al., 2007). Spatial network clustering is therefore best conceptualized as a continuum. If spatial network clustering is low, spatial distances show little association with network structure and individuals are as likely to maintain interactions with somebody who lives close by as with somebody who lives further away. If spatial network clustering is high, spatial distance is strongly associated with network structure and individuals almost exclusively interact with those who live comparatively close by.

3.2.3 The emergence of regional variation in status values

We expect that high spatial network clustering can give rise to the emergence and persistence of regional variation in status values, even when there is no regional variation in cultural and institutional factors that might lead to resource and power differences between social categories. Our argument rests on three propositions. The first two propositions together describe how regional variation in status values might *emerge*. The third proposition describes how such variation might *persist*.

> *Proposition 1: Communities are likely to differ in the status beliefs that spontaneously develop among its members.*

The hierarchy emergence assumption implies that by chance some interactions in a given community might put members of one social category in the status-advantaged position (cf. Mark et al., 2009). The perceived consensus and status belief change assumption holds that this experience might induce a corresponding status belief in at least some community members. If there are no systematic competence differences between members of the different categories, these chance processes will favor either of the two categories with equal probability (cf. Mark et al., 2009; Ridgeway, 2000). In large, geographically distributed populations, many interactions take place simultaneously in different regions and communities. It is therefore likely that members of one category are advantaged in some regions and communities, but are disadvantaged in others.

> *Proposition 2: A spontaneously created status belief is likely to induce consistent interactional experiences in the community in which it has been created and thereby will become consensual among community members.*

The status belief effect assumption holds that individuals are likely to treat their interaction partners in line with their status beliefs. In highly clustered communities, interaction networks are very dense. This means that as soon as at least some community members acquire a given status belief and treat others accordingly, many more community members will be exposed to similar interactional experiences in favor of one category. This might create the impression of consensus, even among those who have not acquired a corresponding belief yet. This, in turn, renders them likely to actually acquire it and ultimately leads to widespread consensus in the community.

> *Proposition 3: Once widespread consensus on a status belief has been reached among the members of a community, this consensus is likely to ward off influence from interactions with members of other communities in which alternative status beliefs might have emerged.*

The perceived consensus and status belief change assumption holds that status beliefs are maintained as long as they are perceived as sufficiently consensual. When spatial network clustering is high, interaction networks are dense within communities but sparse between communities. Consequently, once a status belief actually has become consensual in a given community, members of the same community will be repeatedly exposed to the same interactional experiences. This is likely to reinforce the impression of consensus. This impression, in turn, can ward off social influence from occasional interactions with members of other communities, in which other status beliefs might have emerged.

3.3 The Formal Model

Propositions 1 to 3 jointly describe an intuition about how spatial distances constrain the structure of interactions among individuals and thereby create regional variation in status values. Such macro-to-micro and micro-to-macro interactions are often complex and intuition may be misleading. Agent-based computational modeling enables researchers to assess the logical consistency of predictions about such interactions. It also enables researchers to discover

possible counter-intuitive and unexpected implications of a theory and to study the relative importance of different aspects of face-to-face interaction (Epstein, 2008; Lynn et al., 2009; Macy & Flache, 2009). Our model comprises a micro level and a macro level. Our presentation of the model follows these levels.[9]

3.3.1 Micro level

3.3.1.1 Individuals and their characteristics

There are I individuals represented as agents i. Each agent is characterized by a social distinction N_i and a status belief S_i.The social distinction has the two states A and B ($N_i \in \{A; B\}$). These states are fixed and visible to other agents; the numbers of agents with each characteristic in a given population are indicated by I^A and I^B. The status belief has the three states A, O, and B ($S_i \in \{A; O; B\}$). When $S_i = A$ or $S_i = B$, agent i believes that agents with the corresponding state on N_i are more competent than agents with the other state. We refer to agents with these states on S_i also as 'agents with status beliefs'. $S_i = O$ indicates that i does not believe that agents who differ in N_i differ in competence. These agents are 'agents without status beliefs'.

3.3.1.2 Rules for interaction

Agents engage in small group interaction to reach collective goals. During these interactions, hierarchies can emerge that put some interactants in a status-advantaged (i.e. more influential) position, and other interactants in a status-disadvantaged (i.e. less influential) position. We focus on the dyad as the smallest possible group. Existing research in status construction theory has focused on interactions between individuals who differ in a salient social distinction. In line with this, we also focus on interactions between members of different social categories.

The status hierarchy emergence assumption and the status belief effect assumption hold that the form that a hierarchy between two individuals takes (i.e. which interactant takes the more/less influential role) is affected by their nominal characteristics (N_i) and their status beliefs (S_i). Table 3.1 illustrates how S_i and S_j can combine in dyads whose members differ in the social characteristic N_i ($N_i \neq N_j$). It also shows the probabilities with which certain hierarchical structures emerge in each of these combinations.

First, consider situations in which i and j hold no beliefs, or hold opposing status beliefs (cells 3, 5, and 7 in Table 3.1). In these cases, i's and j's beliefs do not unambiguously imply who is status-advantaged. The hierarchy emergence assumption holds that nevertheless a hierarchy might emerge by chance. Thus, if neither agent i nor agent j hold a status belief, or if they hold opposing beliefs, a hierarchy emerges between them with probability e ($0 \leq e \leq 1$). If a hierarchy emerges, both agents are equally likely to hold the higher status rank (i.e. to be

[9] The micro level builds on and extends Mark et al.'s (2009) model. We therefore do not refer to their work in the remainder of the model description.

		$N_j = B$ $S_j = A$		$N_j = B$ $S_j = O$		$N_j = B$ $S_j = B$
$N_i = A$ $S_i = A$	[1]	$\Pr(R_i > R_j) = 1$	[2]	$\Pr(R_i > R_j) = 1$	[3]	$\Pr(R_i = R_j) = 1 - e$ $\Pr(R_i > R_j) = .5e$ $\Pr(R_i < R_j) = .5e$
$N_i = A$ $S_i = O$	[4]	$\Pr(R_i > R_j) = 1$	[5]	$\Pr(R_i = R_j) = 1 - e$ $\Pr(R_i > R_j) = .5e$ $\Pr(R_i < R_j) = .5e$	[6]	$\Pr(R_i < R_j) = 1$
$N_i = A$ $S_i = B$	[7]	$\Pr(R_i = R_j) = 1 - e$ $\Pr(R_i > R_j) = .5e$ $\Pr(R_i < R_j) = .5e$	[8]	$\Pr(R_i < R_j) = 1$	[9]	$\Pr(R_i < R_j) = 1$

Table 3.1 Possible combinations of status beliefs (S_i) and outcomes of interactions in dyads whose members belong to different social categories ($N_i \neq N_j$). R_i represents the relative status rank of the agents after an interaction between them.

more influential in the interaction and to appear more competent) while the other agent holds the lower status rank (i.e. to be less influential in the interaction and to appear less competent).

Second, consider situations in which either i or j hold a status belief, whereas the respective other agents holds no belief, or in which both agents hold the same belief (cells 1, 2, 4, 6, 8, and 9 in Table 3.1). In these cases, at least one agent is assumed to be more competent than the other by at least one member of the dyad. Thus, a hierarchy that reflects this belief emerges with certainty. We assume that the hierarchical structure that has been created between two agents remains stable until they interact the next time.

3.3.1.3 Rules for status belief acquisition and loss

The perceived consensus and status belief change assumption holds that experiences with hierarchical differentiation between those who differ in their states on the distinction N_i can lead them to acquire beliefs about status difference between the categories. For these beliefs to be maintained, they need to appear widely consensual and should therefore be sufficiently supported in different contexts with different others.

Agents infer the consensusality of a given status belief from the hierarchical relations they maintain with those agents (1) to whom they are connected and (2) with whom they have interacted at least once in the past. When a sufficiently large share of these relations supports a particular belief, agent i assumes a sufficient consensus. If i does not hold any belief yet, it will acquire a corresponding belief with probability a ($0 \leq a \leq 1$). When i already holds a belief and the support for this belief has become so low that i does not perceive it as sufficiently consensual anymore, i will lose the belief with probability l ($0 \leq l \leq 1$). We regulate the share of relations in which a certain type of hierarchy needs to develop before agents perceive the corresponding status belief as sufficiently consensual with the perceived consensus threshold c ($.5 < c \leq 1$). The higher c, the more demanding are agents' requirements for assuming a sufficient consensus among others. Note that agents can acquire beliefs from one interactional

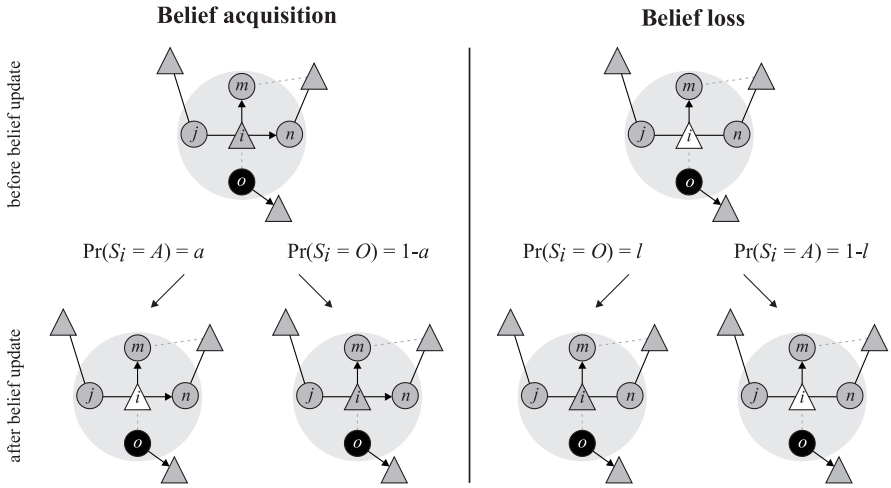

Figure 3.1 Illustration of status belief acquisition and loss. Triangles and circles with solid boundaries represent agents who belong to the categories $N_i = A$ and $N_i = B$ respectively. White, gray, and black coloring of circles and triangles with solid boundaries indicate agents with the status beliefs $S_i = A$, $S_i = O$, and $S_i = B$ respectively. Dashed gray lines between agents indicate that the possibility for dyadic interaction exists but has not been realized yet. Solid black lines indicate that interaction has taken place but that no hierarchy has emerged in the last interaction. Solid black lines with arrowheads indicate that interaction has taken place and that a hierarchy has emerged in which the source/sink of the arrow was in the higher/lower status position.

hierarchical relation, when it is the only one they have ever been involved in.

Agents always need to make the transition through $S_i = O$ before they can acquire a new belief. Thus, when i currently believes A ($S_i = A$) but encounters information that sufficiently supports B, i first needs to lose the belief A (with probability l) when it updates its beliefs. Only after this it can acquire B (with probability a), when it is later again selected to update its beliefs. Note that because of $c > .5$, an agent's experiences can never support both $S_i = A$ and $S_i = B$ at the same time.

Figure 3.1 illustrates the processes of status construction separately for belief acquisition and loss. Consider first status belief acquisition. In the example, agent i currently holds no status belief ($N_i = A$ and $S_i = O$) and has the possibility to interact with four other agents j, m, n, and o, who all differ from it in N_i. Yet, i so far has only interacted with j, m, and n; o is therefore not considered in determining the share of hierarchical relations that supported a given status belief from i's point of view. In the last interactions that took place with these three agents, two hierarchies emerged supporting the belief $S_i = A$, because i occupied the superior hierarchical rank in the last interactions with m and n. In the last interaction with j, no hierarchy emerged and therefore this interaction does not support any belief. In this configuration, a share of about .66 of i's current hierarchical relations support $S_i = A$. Assuming that $c = .6$, this share exceeds the critical threshold and i therefore acquires the belief $S_i = A$ with probability a, and acquires no status belief with probability $1 - a$. Consider next status belief loss. The example shows that

i has at some earlier point acquired the belief $S_i = A$. Assuming that $c = .6$, the configuration shown *does not* support this belief consensually enough (i.e. only a share of .33 of the hierarchies that involve i support this belief). Agent i therefore loses the belief $S_i = A$ (i.e. a change in S_i to $S_i = O$) with probability l and maintains it with probability $1 - l$.

3.3.2 Macro level

3.3.2.1 Spatial distribution of individuals

Agents inhabit a square plane of size $L \times L$. Their places of residence on this world are determined randomly. Spatial distances between them are measured as Euclidean distances d_{ij}^E based on their x-/y-coordinates.

3.3.2.2 Interaction networks

Agents maintain ties with each other, indicating that interaction can take place between them. We are interested in the effects of spatial network structures as an exogenous condition. We therefore abstract from endogenous network formation dynamics and assume that ties are stable over time.

Technically, we represent the structure of interactions in the agent populations as a binary network in which an interaction tie x_{ij} between two population members can either be present ($x_{ij} = 1$) or absent ($x_{ij} = 0$). Agents can only interact with each other when they are connected by a tie. We do not allow agents to interact with themselves ($x_{ii} = 0$) and we only model ties between agents who differ in N_i.

The interaction network is generated at the beginning of a given simulation run. During the generation process, agents are randomly selected one at a time (without replacement) to choose a number of k ($0 < k \leq \#N_i \neq N_j$) other agents (where $\#N_i \neq N_j$ is the number of agents who differ from i in N_i), to which they are not connected yet, for establishing a tie. The likelihood that agent i will select a given agent j from the set of available alternatives is proportional to the value of the spatial distance function $f\left(y, d_{ij}^E\right)$ over all alternatives. This function is defined as

$$f\left(y, d_{ij}^E\right) = \exp\left(-y d_{ij}^E\right), \tag{3.1}$$

in which y ($0 \leq y \leq \infty$) governs the effect that spatial distance has on the probability that agent i selects a another agent j for establishing a tie (cf. Daraganova et al., 2012). Given that k governs the number of ties that exist in the agent population, from here on we refer to it also as the *density parameter*. Similarly, we refer to y as the *spatial distance effect*.

Our earlier definition of spatial network clustering is based on (1) the spatial distance that ties cover and (2) the extent to which individuals who live close to each other are connected to the same set of other agents. Regarding aspect (1), increasing the value of density parameter (k) increases the number of the ties that exist in the population. For a given level of k, increasing the spatial distance effect (y) reduces the average distance that ties cover. Regarding aspect (2),

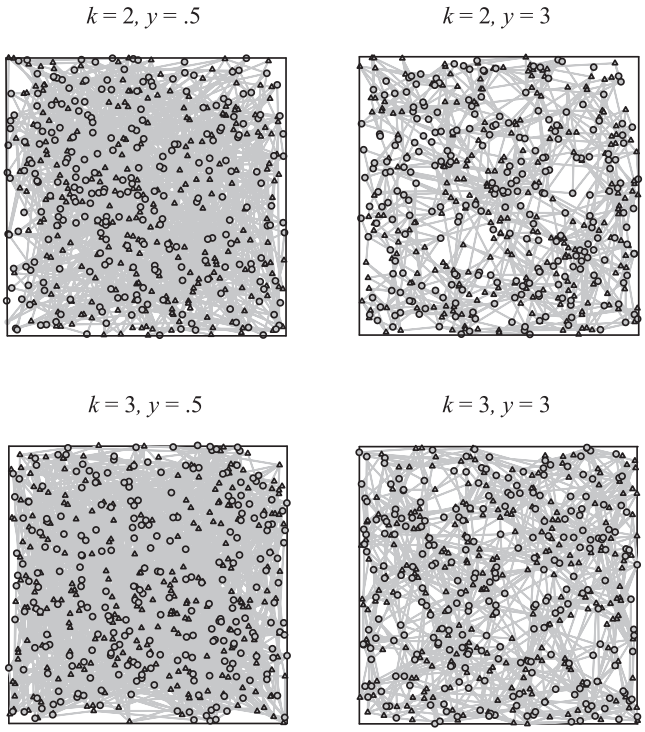

Figure 3.2 Illustration of spatial network clustering, contingent on the density parameter (k) and the spatial distance effect (y). Triangles and circles with solid boundaries represent agents with the states of the social distinction $N_i = A$ and $N_i = B$ respectively. Lines between agents indicate the possibility for dyadic interaction. Parameter setting: $I = 500$ and $I^A = I^B = .5I$.

for a given level of k, increasing the value of y makes it more likely that agents who live close to each other are connected to a similar set of other agents. Thus, as both k and y increase, spatial network clustering increases. This relation holds as long as k is not so large that agents exhaust their local neighborhood for selecting interaction partners before they select k interaction partners. In our experiments (see below) we limited k to a maximal value of 7 and y to a maximal value of 5. For these ranges, combined with the other settings in our experiments, it is the case that network clustering tends to be higher at higher levels of both k and y.

Figure 3.2 illustrates the interplay between k and y for worlds of size 5×5 with 500 agents (250 for which $N_i = A$ and 250 for which $N_i = B$). Spatial network clustering is highest for the combination $k = 3/\ y = 3$, because agents are mostly connected to their immediate neighbors and because neighbors are connected to similar sets of other agents. Spatial network clustering is somewhat lower for the combination $k = 2/\ y = 3$, because neighbors are somewhat less connected to the same set of other agents. Spatial network clustering is lowest for the combinations $k = 2/\ y = .5$ and $k = 3/\ y = .5$, given that spatial distance has little

impact on the selection of population members for establishing interaction ties.

3.3.3 Outcome measures

We assess the regional variation in status values with two measures. The first is Grannis' (2002) multi-group extension of White's (1983) measure of spatial segregation (MSS). This measure treats status beliefs (S_i) as a categorical variable and focuses on spatial clustering of agents with the same states on S_i, regardless of the exact difference in S_i among adjacent clusters. We calculate MSS as

$$MSS = \frac{\sum_g (G/I)\left[(1/G)\sum_i \sum_j p_{ij,g}^E\right]}{(1/I)\sum_i \sum_j p_{ij}^E}, \tag{3.2}$$

where G refers to the number of agents in three groups whose members share the same state on S_i, and $p_{ij,g}^E$ refers to spatial proximities among agents with the same state on S_i (calculated as $exp\left(-d_{ij}^E\right)$). Eq. (2) indicates that the value of MSS is determined by (1) calculating the average spatial proximities among agents with the same state on S_i separately for each state of S_i, (2) weighting these averages by the share of agents with the respective state on S_i in the population, (3) summing the resulting weighted averages, and (4) diving this sum by the average proximities among all agents in the population. MSS values larger than 1 indicate positive regional variation in status values, so that agents with the *same* states on S_i tend to live close to each other. MSS values smaller than 1 indicate negative regional variation in status values, so that agents with *different* states on S_i tend to live close to each other. The value 1 is obtained both when there is no variation in S_i in the agent population (i.e. a population-wide consensus) and when there is variation, so that agents with different states on S_i are randomly distributed across the world's surface.

The second measure is Spearman's rank order correlation (SRO) between spatial proximities and proximities in status beliefs among agents. This measure takes advantage of the fact that the three states of S_i can be conceived as three levels of an ordinal variable. Assuming that we can represent the three states A, O, and B of S_i numerically as -1, 0, and 1 respectively, we calculate SRO as

$$SRO = \frac{\sum_i \sum_j \left(\rho_{ij}^S - \bar{\rho}_{ij}^S\right)^2 \left(\rho_{ij}^E - \bar{\rho}_{ij}^E\right)^2}{\sqrt{\sum_i \sum_j \left(\rho_{ij}^S - \bar{\rho}_{ij}^S\right)^2 \left(\rho_{ij}^E - \bar{\rho}_{ij}^E\right)^2}}, \tag{3.3}$$

where ρ_{ij}^E and ρ_{ij}^S refer to rank ordered spatial proximities and rank ordered status belief proximities among pairs of agents respectively. That is, ρ_{ij}^E is the rank of the spatial proximities (p_{ij}^E) among all pairs of agents, whereas ρ_{ij}^S is the rank of the status belief proximities ($p_{ij}^S = -\left|S_i - S_j\right|$) among all pairs of agents. The value of SRO can vary continuously between -1 and 1. SRO values larger than 0 indicate positive spatial clustering and values smaller than 0 indicate negative spatial clustering. The value 0 can be obtained both with no variation in S_i in

the agent population and with variation in S_i so that agents with different states on S_i are randomly distributed across the world's surface.

In direct comparison, SRO puts emphasis on the population-level ordering of agents with the three states of S_i in terms of spatial proximity, whereas MSS only focuses on whether any differences in S_i among agents coincide with spatial proximities among them. That is, for MSS, an ordering of agents with the beliefs A, O, and B from 'east to west' on the world's surface generates the same value as the ordering A, B, and O. For SRO, the value is higher for the first ordering than for the second ordering. Both measures tend to approach their highest values when agents with different states on S_i are perfectly clustered. This is the case in both of the two foregoing examples. However, both measures tend to decrease if multiple clusters of agents with the same state on S_i emerge, which are somewhat spread across the world. This is the case, for instance, if agents in 'east' and in the 'west' believe A, whereas agents in the 'center' of the world believe B.

Next to MSS and SRO, we also report how many of the simulation runs had reached a steady state, so that given the structure of the interaction network and the distribution of status beliefs (S_i) no agent could be induced to change its current state on S_i anymore (see Section 3.6.1 in the appendix to this chapter for details). We also assessed how many agents had acquired status beliefs.

3.4 Experiments and Results

3.4.1 Experimental setup

At the macro level, we varied the level of spatial network clustering (as determined by the density parameter k and the spatial distance effect y) to assess its effect on regional variation in status values. At the micro level, our argument highlights the importance of perceived consensus for the maintenance of regional variation in status values. We thus assessed the sensitivity of results to the threshold for belief acquisition and maintenance (c).

We focused on worlds with $I = 500$ agents ($I^A = I^B = .5I$) who initially held no status belief ($S_i = O$). We varied the density parameter ($k = \{2,3, \cdots ,7\}$) and the spatial distance effect ($y = \{0,1, \cdots ,5\}$) both in six steps. With this parameterization, network clustering tends to be higher when both k and y are maximal. We only selected networks that consisted of one component. When there is more than one component, some parts of the population are completely disconnected from each other. In this case, status beliefs cannot diffuse throughout the population and finding any regional variation in status values would be coincidental.

Concerning the micro level, we had no primary interest in effects of the likelihood with which hierarchies emerge (e) and with which agents acquire (a) or lose (l) status beliefs. We therefore fixed each of these parameters to an intermediate level of .5. To be able to assess how outcomes were affected by variation in the perceived consensus that belief acquisition and maintenance require, we varied the perceived consensus threshold c in five steps ($\{.55, .65, \cdots , .95\}$).

The different levels of k, y, and c created 180 experimental conditions. For reliability, we

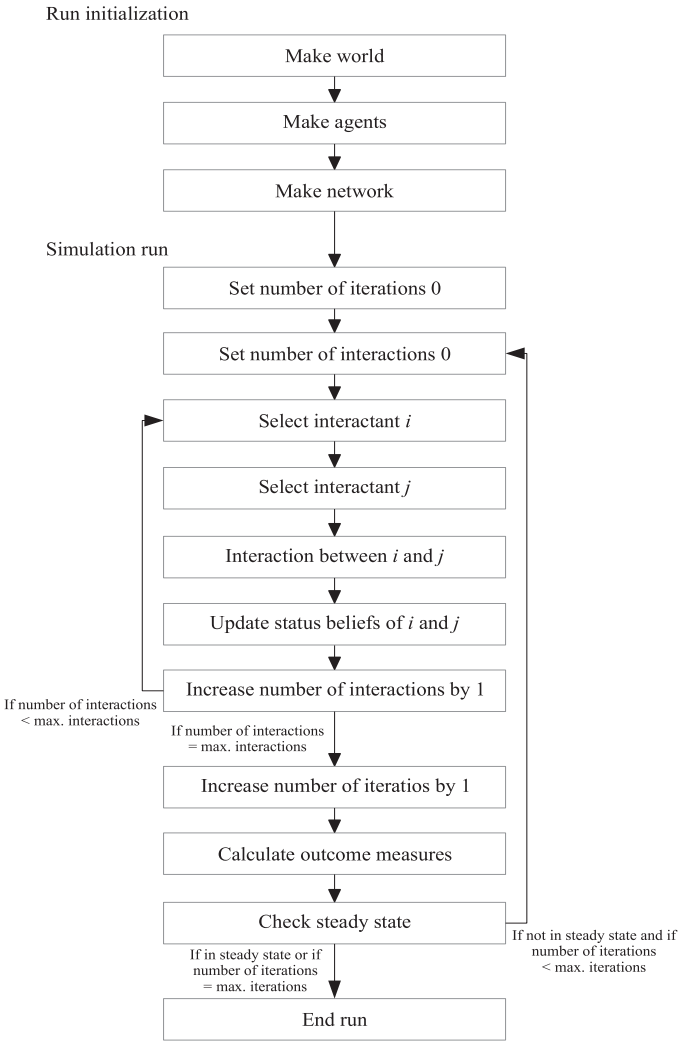

Figure 3.3 Scheduling of simulation runs.

conducted 100 independent simulation runs within each condition and averaged outcomes over these runs. Figure 3.3 illustrates that each run started with initializing the world, populating it with agents, and subsequently creating the interaction network among them. After that, the actual simulation started and continued either for 3,000 iterations, or until a steady state was reached. In each iteration, 5,000 times a dyad of agents between whom an interaction tie existed

was randomly selected (with replacement) for interaction.[10] The beliefs of the interactants were updated immediately after their interaction. At the end of each iteration first the outcome measures were calculated and subsequently it was determined whether the run had reached a steady state.[11]

3.4.2 Results

Figure 3.4 shows the share of runs that had reached a steady state within the allotted period. The figure suggests that when threshold for belief acquisition and maintenance (c) was low to medium ($c < .85$), most runs had reached a steady state before the time limit was reached, regardless of the level of spatial network clustering. Yet, when the threshold was high ($c \geq .85$), the number of runs that had reached a steady state decreased, especially at higher levels of spatial network clustering (i.e. when both the spatial distance effect y and the density parameter k increased). We assessed the reliability of our results for this part of the parameter space by examining the stability of the outcome measures over the duration of the simulation process (see Section 3.6.2 in the appendix to this chapter for details). Generally, the observed level of regional variation in status values (i.e. the levels of MSS and SRO) tended to remain stable after about 1,000 iterations, even in those runs that had not reached a steady state in the allotted time frame.

Figure 3.5 shows the share of agents that had acquired a status belief (i.e. a state of S_i that was different from O). The figure suggests that generally there was a tendency for status beliefs to emerge. This tendency was stronger at lower levels of the threshold for belief acquisition and maintenance (c). Increases in the density parameter (k) typically led to an increase in the share of belief-holders. Only at the highest levels of c ($c = .95$), increasing the density parameter (k) typically led to a decrease in the share of belief-holders. Increasing the spatial distance parameter (y) tended to slightly decrease the share of belief-holders. Only at the highest levels of c ($c = .95$), increasing y typically led to a decrease in the share of belief-holders.

For the outcomes of main interest, i.e. the measures related to regional variation in status values, we proposed the intuition that spatial network clustering makes the emergence and persistence of regional variation in status values more likely. Both the outcomes that we

[10] First agent i was selected at random and then another agent j was selected at random for interaction. We constrained this selection for computational efficiency in the following way. First, when selecting i, we excluded agents who were involved in a local network configuration in which (1) all potential interaction partners held the same status beliefs as they did ($S_i = A$ or $S_i = B$) and in which (2) all current hierarchical relations with these partners supported this belief. For such agents, their interactions with each potential interaction partner would reproduce the existing hierarchy between them with certainty and therefore could never induce a change in i's (or any j's) state on S_i. Second, when selecting j, we excluded all agents who held the same status belief as i ($S_i = A$ or $S_i = B$) and whose current hierarchical relation with i supported this belief. Again, interactions with these agents could on its own never induce a change in i's (or any j's) state on S_i. We assessed the effect of this procedure on simulation outcomes conducting a smaller experiment in which agent selection occurred unconstrained. The results were virtually identical to the results reported in this chapter. The only difference was that, as expected, runs typically did not reach a steady state in the allotted time frame.

[11] We implemented the model in NetLogo 5.0.5 (Wilensky, 1999).

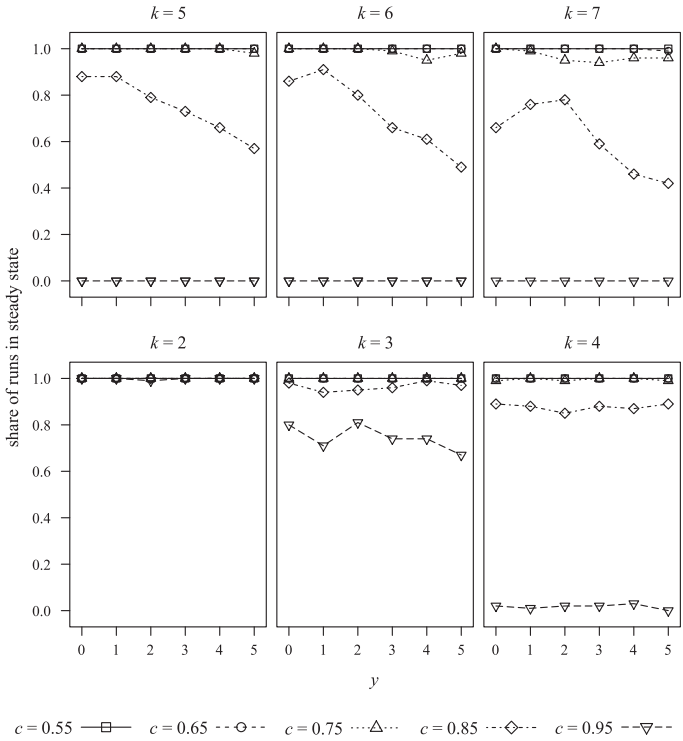

Figure 3.4 Share of runs that had reached a steady state contingent on the density parameter (k), the spatial distance effect (y), and the consensus threshold (c) after up to 3,000 iterations. Parameter setting: $I = 500$, $I^A = I^B = .5I$, and $e = a = l = .5$. Shares are based on 100 independent simulation runs per condition.

obtained for the measure that takes a categorical view on status beliefs (MSS) and the measure that takes an ordinal view (SRO) support this intuition. Figure 3.6 shows the average outcome that our model generated for MSS. The figure suggests that regional variation in status values tended to increase when spatial network clustering increased (i.e. when the spatial distance effect y and the density parameter k increased). In particular, given a number of ties that agents maintained with each other (i.e. given a value of k), increases in the spatial distance effect (y) led to an increase in MSS. However, this effect was attenuated by the threshold for belief acquisition and maintenance (c). That is, when c was at its highest value ($c = .95$), the effects that increases in k and y had on MSS were weaker. Note further that at low to intermediate values of k and the highest level of y, the average value of MSS seemed to decrease somewhat compared to low to intermediate values of y. This is due to the fact that small values of k in combination with large values of y lead to smaller and more secluded communities of agents. This makes it more likely that a number of communities with the same beliefs emerge, but which are spread over the world's surface, instead of being concentrating in one larger region. This increases the average spatial distance among agents with the same state on S_i, which leads

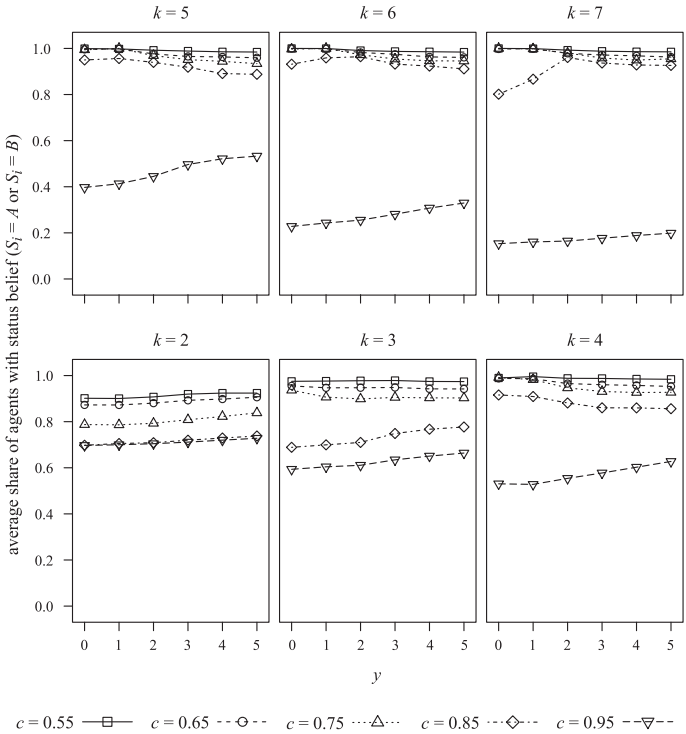

Figure 3.5 Share of agents that had acquired a status belief contingent on the density parameter (k), the spatial distance effect (y), and the consensus threshold (c) after up to 3,000 iterations. Parameter setting: $I = 500$, $I^A = I^B = .5I$, and $e = a = l = .5$. Averages are based on 100 independent simulation runs per condition.

to a slight decrease in MSS, even with a high level of regional variation in status values.

Figure 3.7 shows the average outcomes that our model generated for the outcome measure that takes an ordinal view on status beliefs (SRO). The results are very similar to the results for takes a categorical view on status beliefs (MSS). That is, the value of SRO tended to increase with higher levels of spatial network clustering (i.e. with higher values of the spatial distance effect y and the density parameter k increased), but this increase was attenuated by the threshold for belief acquisition and maintenance (c). Note that also the value of SRO decreased at low to intermediate levels of k and the highest levels of y, and this decrease was more pronounced than in the case of MSS. This is because of the emphasis of SRO on the exact ordering of the different status beliefs (i.e. of the different states of S_i) over the world's surface. This focus leads SRO to decrease stronger than MSS when multiple communities of agents with the same states on S_i are spread over the world's surface.

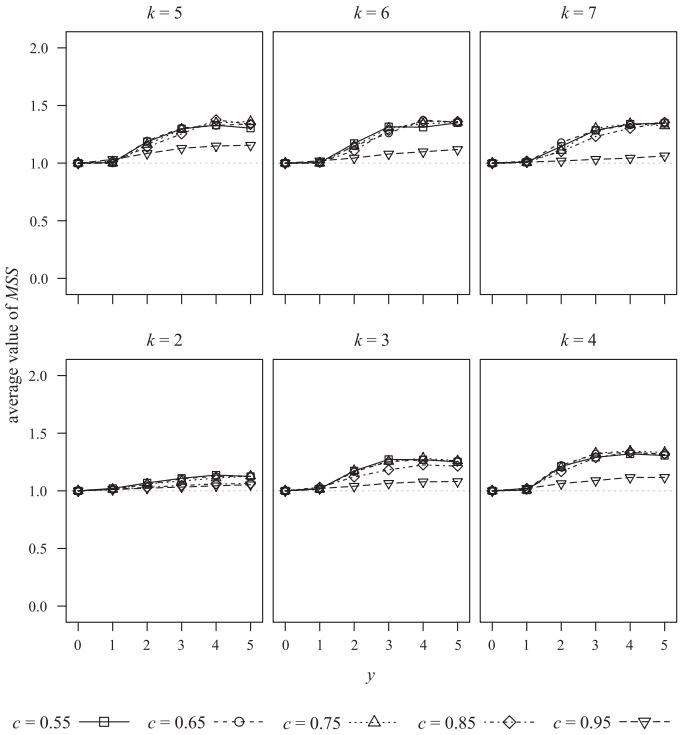

Figure 3.6 Average value of multigroup spatial segregation measure (MSS) contingent on the density parameter (k), the spatial distance effect (y), and the consensus threshold (c) after up to 3,000 iterations. Parameter setting: $I = 500$, $I^A = I^B = .5I$, and $e = a = l = .5$. Averages are based on 100 independent simulation runs per condition.

3.5 Discussion and Conclusion

In this chapter, we proposed a new theoretical model that can account for regional variation in status values. We translated our informal theory into a formal, agent-based model that we submitted to systematic computational experiments. These experiments supported the following implications of the theory. First, the processes that status construction theory describes entail a strong tendency to give a nominal social distinction status value. Second, regional variation in status values tends to increase with increasing spatial network clustering. Third, both of the foregoing tendencies are attenuated by the perceived consensus that is needed before individuals acquire or maintain status beliefs. The first finding is in line with earlier research by Mark et al. (2009), on which our work builds. The second finding is in line with the theoretical intuitions we proposed. The third finding, however, requires closer inspection.

Why does a higher threshold of perceived consensus before beliefs are acquired and maintained affect the level of regional variation in status values? The more consensual a status

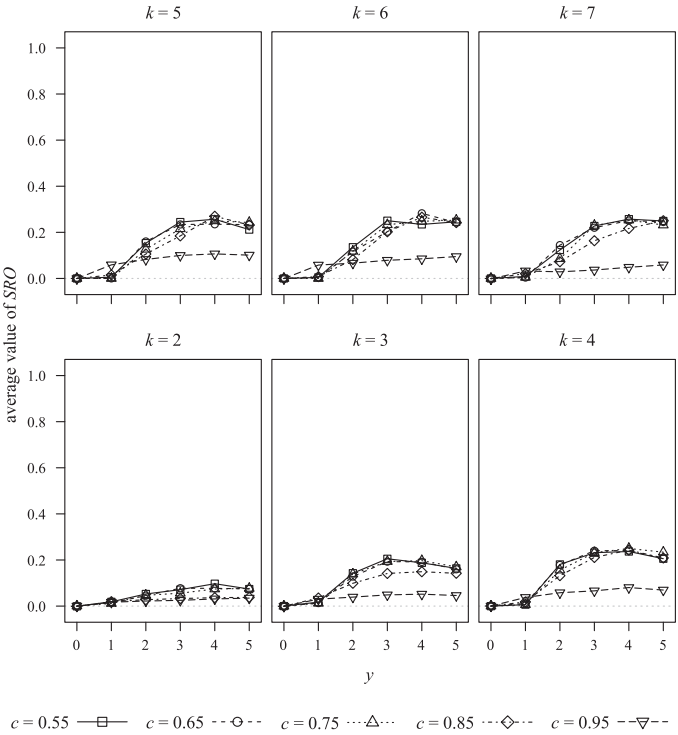

Figure 3.7 Average value of Spearman's rank order correlation (*SRO*) between spatial proximities and status belief proximities among agents contingent on the density parameter (k), the spatial distance effect (y), and the consensus threshold (c) after up to 3,000 iterations. Parameter setting: $I = 500$, $I^A = I^B = .5I$, and $e = a = l = .5$. Averages are based on 100 independent simulation runs per condition.

belief needs to appear before individuals acquire it, the less likely it becomes that a random interaction sequence emerges that sufficiently supports it. Even if such a sequence occurs, the newly acquired belief is precarious. Already a few deviating experiences are sufficient to undermine it. This impedes the emergence and maintenance of status beliefs and thereby also hampers the development regional variation in these beliefs. It is an empirical question how much perceived consensus it takes before individuals acquire or maintain status beliefs in real life. However, our results suggest that even if the required amount is rather high, regional variation in status values is still more likely to occur when interaction networks are spatially clustered.

Our model is a minimal model. It describes empirically supported micro-behavioral processes and macro-structural conditions, which together are sufficient to generate regional variation in status values. It necessarily abstracts from other factors that might affect the emergence and diffusion of status beliefs in real life. Future research that integrates such aspects into the model might produce intriguing new insights.

One important factor that we excluded is resource and power differences between members of the different social categories. Such differences often exist in real life and can vary across geographic regions. Status construction theory explicitly allows for the inclusion of such differences. In an early formulation of the theory, Ridgeway (1991) stressed that salient differences in resources and power between individuals are often used as cues for inferring differences in competence (see also Ridgeway & Balkwell, 1997; Ridgeway, Boyle, Kuipers, & Robinson, 1998; Webster & Hysom, 1998). What implications could this have in the light of our analysis? Imagine a population with spatial network clustering and imagine that in some geographic regions the members of one category are *slightly* resource advantaged, whereas the opposite association exists in other regions. Likely, the behavioral processes that our model describes will reinforce and amplify biases in status beliefs induced by these initially small differences. Consequently, the regions will end up with large differences in status values.

Resource and power differences not only lead to status values. Status values can also lead to resource and power differences (Ridgeway, 1991). That is, members of status-advantaged categories often receive more resources by others and more easily attain positions of power. In the light of our model, this reversed causality has important implications for current research practice. Earlier research has typically started with identifying regional variation in factors that, historically, might have led to regional variation in power and resources between social categories and thereby might have led to regional variation in status values. Our model suggests the theoretical possibility that regional variation in the distribution of power and resources might in some cases also be *preceded* by regional variation in status values. Future research might benefit from taking the possibility of such reversed causation into account.

A second important factor is that individuals might tend to move to regions where they can live among individuals who share similar mindsets (Bishop, 2008). This might also apply to status beliefs. Arguably, such a tendency could facilitate the emergence of regional variation in status values.

Existing research in status construction theory has focused on easily discerned categorical distinctions as this facilitates analytical clarity (cf. Ridgeway, 1991). We followed this tradition. It enabled us to rely on a large body of empirical research in developing our theoretical model. Future modeling attempts might widen the scope of the model by incorporating graduated or less easily discernible, social distinctions. However, before more empirical research in this direction becomes available, the assumptions that underlie such modeling attempts will necessarily be more tenuous.

Similarly, existing research in status construction theory focuses on indirect social influence processes that derive from interactional experiences among members of different social categories. In our minimal model, we focused on these experiences to show that they are sufficient to generate regional variation in status values. However, a second important source of social influence might be the direct communication of status beliefs between members of the same social categories. For example, men might communicate to other men what they believe that women, in general, are capable of. Future research might incorporate this source of status beliefs into our model. However, given the lack of research into how individuals integrate information derived from interactional experience and direct communication in the formation

of status beliefs, such extensions would be more speculative.

The results of our model have important implications for the explanatory scope of status construction theory. Our model builds on Mark et al.'s (2009) minimal model of status construction processes. Their work shows that in populations whose members are at least indirectly connected to each other, the theory's central assumptions have a strong tendency to create population-wide consensus in status beliefs. Yet, they abstracted from social network structures and from the role that perceived consensus plays in belief acquisition and maintenance. Our analysis suggests that once social network structures and a need for consensus for belief acquisition and maintenance are considered, the described mechanisms may produce population-level divergence with local convergence in status beliefs, instead of population-wide consensus.

Finally, the results of our computational experiments provide testable hypotheses for empirical research. As noted earlier, populations can vary in the extent to which social networks are spatially clustered. Our model predicts that populations in which spatial network clustering is higher are more likely to show regional variation in status values, even after controlling for possible differences in cultural and institutional factors that might affect these values. Brashears (2008) recently demonstrated how predictions of status construction theory can be tested by means of survey data. Additionally, over the last decades, an increasing number of studies have examined the spatial structure of social networks by analyzing communications data in larger populations (e.g., Lambiotte et al., 2008). Pairing survey data with information about spatial network structures would enable researchers to test the predictions of our theory.

3.6 Appendix to Chapter 3

3.6.1 Steady states

It is possible that agent i is embedded in a configuration in which it cannot be induced to change its state on S_i, unless at least one other agent to which it is connected changes its state on S_i first. When i has reached such a state, we say that i is in an *individually stable state*. When all agents have reached an individually stable state, it is impossible that any agent will change its state on S_i in the future. In this case we say that the simulation run has reached a *steady state*. The configurations that create an individually stable state differ between agents with status beliefs ($S_i = A$ or $S_i = B$) and agents without status beliefs ($S_i = O$).

3.6.1.1 Individually stable state for agents with status beliefs

Agents with $S_i = A$ or $S_i = B$ can reach an individually stable state when the share of *stable belief supporting hierarchies* with other agents is equal to or exceeds c. To illustrate what this means, consider again the belief acquisition process shown in Figure 3.1 in the main part of this chapter. Assume that i has acquired the belief $S_i = A$, as shown in the lower left corner of the figure. In this case, the hierarchies that developed in i's interactions with m and n are considered stable belief supporting hierarchies, because m and n hold no beliefs. This means that their interactions with i will always reproduce the depicted hierarchical differentiation that

supports $S_i = A$, unless i's, m's or n's state on S_i change first. Agent i's relation with both j and o, on the other hand, are *non-stable hierarchies*. The hierarchy with j is non-stable, because the neutral hierarchy that developed during their last interaction will change during their next interaction into a hierarchy that supports $S_i = A$, unless i's or j's state on S_i changes first. Similarly, when the potential interaction with o is realized, there is a chance of .5 that a hierarchy emerges between i and o that either supports or undermines $S_i = A$, unless i's or o's state on S_i change first.

By comparing the share of stable belief supporting hierarchies with the consensus threshold c, we can determine whether i's belief is sufficiently supported by stable hierarchies and will thus not change in subsequent interactions, unless the state on S_i of one or more of i's interaction partners changes first. Considering both realized and potential interactions, in the foregoing example, the share of stable supporting hierarchies is .5. When we assume that $c =$ .6, i is not yet in an individually stable state.

However, imagine that during the last interaction between i and j i dominated j. In this case, a share of .75 of i's relations are stable belief supporting hierarchies, and its state on S_i will therefore not change, regardless of the outcome of a potential interaction with o, unless j's, m's, or n's states on S_i change first.

3.6.1.2 Individually stable states for agents without status beliefs

Consider next agents with $S_i = O$. These agents can reach a stable state when (1) the share of stable hierarchies that support $S_i = A$ plus the share of all non-stable hierarchies is smaller than c and (2) the share of stable hierarchies that support $S_i = B$ plus the share of all non-stable hierarchies is smaller than c. Formulated differently, agents with $S_i = O$ are in an individually stable state when all interactions that are already stable, plus all hierarchies that could change, would still not be enough to sufficiently support either $S_i = A$ or $S_i = B$.

3.6.2 Outcome stability

The results of our main computational simulation experiments show that at higher levels of the perceived consensus threshold c a smaller share of runs had reached a steady state. Especially for $c = .85$ at high levels of spatial network clustering (i.e. at high values of the density parameter k and the spatial distance effect y) we observed comparatively high levels of regional variation in status values, while some runs had not reached a steady state yet. To gain insights into how stable our results were in this part of the parameter space, we conducted 20 additional simulations runs for $c = .85$, in which we fixed the network parameters k and y to $k = 7$ and $y = 5$ (which generates high levels of network clustering) and recorded outcomes after each iteration.

Figure 3.8 shows trace plots of the outcome measures MSS and SRO. The figure suggests that most of the variation in the outcome measures within runs occurred over the first 1,000 iterations (i.e. during the first 5 million interactions). From this point on, the outcome measures remained comparatively stable. Note that despite this stability, it is possible that in a given run a string of interactions might lead to a different belief configuration, if the run continued for

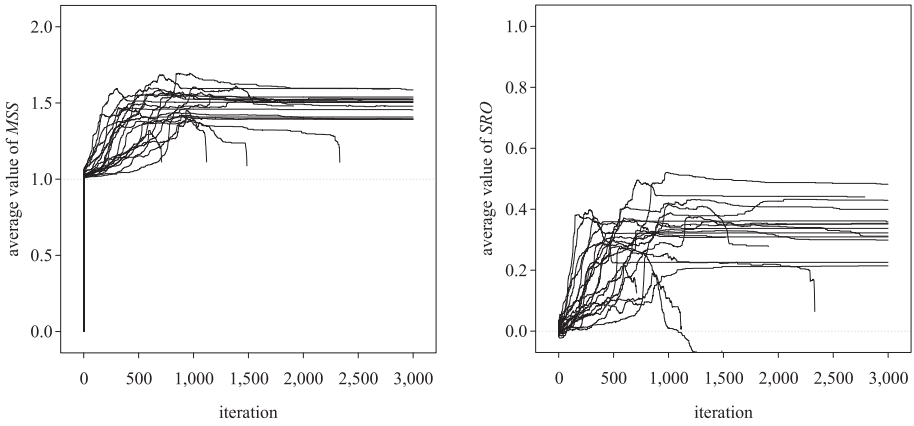

Figure 3.8 Values of multigroup spatial segregation measure (MSS) and Spearman's rank order correlation (SRO) over the course of 20 simulation runs with $k = 7$, $y = 5$, $c = .85$, $I = 500$, $I^A = I^B = .5I$, and $e = a = l = .5$.

much longer. Nevertheless, the results shown in Figure 3.8 suggest that at least over the time span that we examined, the average level regional variation in status values was higher at higher levels of spatial network clustering.

Part 2

The Laboratory and Scope Conditions

Chapter 4

Status and Interdependence in Organizational Teams: A Case Study of a Dutch Childcare Organization*

Abstract

Status differentiation can strongly affect the processes and performance of organizational teams. Functionalistic accounts of status differentiation hold that it operates as an informal incentive system, in which team members reward the performance of others with respect and deference to facilitate team success. Earlier research has implicitly assumed that the postulated link between status and performance in team settings is universal. In this chapter, we argue that the status-performance link is not as universal as assumed and crucially depends on the level of task interdependence and informal interdependence that team members experience. We predict that individuals are more likely to reward the performance of their colleagues with respect when they experience higher levels of task interdependence, but are less likely to do so when they experience higher levels of informal interdependence. We test these predictions with data collected in 15 teams of a medium-sized Dutch childcare organization. Our results suggest that in this sample task interdependence moderates the relation between respect and performance. Informal interdependence, by contrast, generally increases the respect that team members have for others, but does not moderate the relation between performance and respect.

*This chapter is co-authored with Rafael Wittek and Andreas Flache and at time of writing was in preparation for submission to a scientific journal.

4.1 Introduction

Status differentiation can strongly affect the processes and performance of organizational teams. Status is the respect and prominence that individuals have in the eyes of others (Anderson et al., 2015; Magee & Galinsky, 2008; Mannix & Sauer, 2006). Team members who command more respect than their colleagues are typically more involved in the group task and are more influential in group decision processes (Berger et al., 1980). High status team members tend to have a disproportional impact on team processes and outcomes, even if all team members have equal standing in the formal organizational blueprint (Anderson & Kennedy, 2012). Given this impact on group work, an increasing number of management scholars are asking why and under which conditions status differentiation emerges in organizational teams (Anderson & Kennedy, 2012; Chen, Peterson, Phillips, Podolny, & Ridgeway, 2012; Cheng et al., 2013; Magee & Galinsky, 2008; Mannix & Sauer, 2006; Meeussen & van Dijk, 2015; Pearce, 2010; Waldron, 1998).

Most current theorizing in management research takes a *functionalistic perspective* on status differentiation in teams (Anderson & Kennedy, 2012; Chen et al., 2012; Magee & Galinsky, 2008). In this perspective, status differentiation operates as an informal incentive system that motivates team members to contribute to the team's goals and refrain from the temptation to free-ride on the efforts of others. Specifically, functionalistic accounts assume that in small group settings, individuals both desire the respect of others and respect those who make outstanding contributions to collective goals. The prospect of gaining appreciation from colleagues, in turn, motivates them to work hard for the team, even when they could benefit from withholding effort and focusing on their own interests instead.

The assumption that individuals are willing to grant status to those who make outstanding contributions to the tasks important to team members is in line with insights from a large body of experimental research on status differentiation in small groups with a collective task focus (for early studies on this issue see Bales, 1950, 1970). Existing management research has taken for warranted that also outside the laboratory individuals are willing to grant status to those who show outstanding performance in task focused group settings. However, in this chapter we suggest that outside the laboratory, this willingness is not as universal as earlier research has implicitly assumed. We argue that both the level of *task interdependence* and *informal interdependence* that team members experience affect their willingness to grant status to high performing colleagues.

Our argument starts from the insight that status is a zero-sum commodity that can lead to competition and tensions among team members (Bendersky & Hays, 2012; Blau, 1964; Groysberg, Polzer, & Elfenbein, 2010; Porath, Overbeck, & Pearson, 2008). Individuals who grant status to other team members run the risk of lowering their own status and jeopardizing the social integration of the team. Based on this, we assume that individuals only confer respect for performance when they expect that the benefits of such conferrals outweigh their costs. Drawing on related research on organizational teams (e.g., Doerr et al., 2004; Koster et al., 2007) and small groups (e.g., Bianchi & Lancianese, 2007; Blau, 1964), we expect that the level of task interdependence and informal interdependence that team members experience will

crucially affect these subjective costs and benefits, and thereby will act as moderators in the relation between performance and respect.

Task interdependence, on the one hand, refers to the extent to which the tasks of team members are connected, so that the performance of one individual can benefit the performance of others. Informal interdependence, on the other hand, refers to the extent to which individuals maintain strong supportive social bonds with the other members of their team. We argue that when team members experience higher levels of task interdependence, they will perceive their own outcomes more dependent on the performance of their colleagues and will therefore expect to benefit more from motivating them to perform well. Consequently, they will be more willing to reward high performance with respect. When team members experience higher levels of informal interdependence, by contrast, they will be more concerned that performance-based status differentiation might undermine the strong social bonds that exist in the team. Therefore, they will be less willing to make their respect contingent on performance.

In the controlled and short-lived environment of laboratory groups, concerns for own status and social relations are not very likely to affect individuals' status allocation behavior. In enduring groups outside the lab, by contrast, we expect that such motives play an important role. To assess the moderating roles of the two forms of interdependence, we make use of two waves of sociometric data that contain information about the patterns of respect and performance among 66 members of 15 teams of social workers in a medium-sized Dutch childcare organization. To preview results, our analyses suggest that the task interdependence that team members experience increases their willingness to confer status for performance as predicted. By contrast, we find no evidence that the level of informal interdependence affects the relation between status and performance. In the remainder of this chapter, we first discuss the theoretical background of our research and present our hypotheses. Subsequently, we present the research design, data, and results. We conclude with a discussion of our findings for current theorizing on status differentiation in organizational teams.

4.2 Theory and Hypotheses

4.2.1 The benefits and costs of granting status in organizational teams

Existing research commonly assumes that individuals value the respect and admiration of their peers for both instrumental and intrinsic reasons (Anderson et al., 2015; Frank, 1985; Magee & Galinsky, 2008). From an instrumental point of view, respect and admiration are often associated with influence, power, and privileged access to valued resources (Berger et al., 1980; Thye, Willer, & Markovsky, 2006; Willer, 2009). Individuals therefore strive for status to gain accesses to these commodities. From an intrinsic point of view, it has been assumed that humans developed a 'taste for status' in their evolutionary past, due to the reproductive advantages that come with influence, power, and resources (Anderson et al., 2015; Cheng, Tracy, & Henrich, 2010; Frank, 1985; Huberman, Loch, & Onculer, 2004).

Given that status tends to have subjective value, it has similarities with other valuable commodities that individuals strive for (Frank, 1985). However, it is also different from many commodities in two crucial aspects. First, status is a zero-sum commodity. The instrumental

and intrinsic benefits that accrue to high status positions can only be acquired when a given individual is relatively more respected than others. To illustrate this, consider a group in which all group members are equally respected, no matter how much or little. In this context, nobody can exert more influence on the decision process or will acquire privileged access to resources. Thus, striving for status has the tendency to generate positional treadmills on which individuals compete for the respect of their peers. Second, status is not a commodity that can be owned independently of others. Instead, status "exists entirely in the eyes of others[, and is] conferred by them" (Magee & Galinsky, 2008, p. 364). In team settings, those who demand status are those who control its supply (Blau, 1964; Brennan & Pettit, 2004).

Existing research in the functionalistic perspective has highlighted the potential benefits that performance-based status competition can have for a team and its members. The benefits derive from the fact that in team settings, individuals' work and personal outcomes tend to be interlocked, so that the good performance of one team member can benefit the work of others and can make team success more likely. What has largely been neglect, however, is the fact that status is a zero-sum commodity that makes conferring status to others a potentially costly act. That is, whenever one team member shows respect and admiration toward another team member, such gestures have the potential to lower the status of the originator relatively to that of the receiver and the rest of the team (Blau, 1964; Gould, 2002; Grow, Flache, & Wittek, 2015; Skvoretz & Fararo, 1996). Consequently, individuals tend to be reluctant to show their respect for others too freely and sometimes engage in strategic behavior that aims at extracting gestures of respect from others even if they are not merited (Anderson & Kennedy, 2012).

Furthermore, individuals tend to value the friendship and social support of their peers, next to social status (Blau, 1954; Goode, 1979). Status differentiation can "inhibit [such] sociable interaction[s] and create[s] some social distance between the leading group members and the rest" (Blau, 1964, p. 49). Even more, status differentiation and competition for high status ranks can lead to negative emotions among group members. That is, the "more successful [individual] A is in impressing B and earning B's high regard, the more displeasure he causes to C whose relative standing in the eyes of B has suffered" (Blau, 1964, p. 44). This displeasure tends to reduce the satisfaction among low status group members and decreases their attachment to the group. It can even lead to conflict about the legitimacy of the status hierarchy (Bendersky & Hays, 2012). Consequently, the more emotionally attached individuals are to the other members of their team and the more they value social integration, the more costly they might perceive it to make their regard for others contingent on their performance (cf. Bianchi & Lancianese, 2007).

Taken together, we argue that in organizational teams rewarding respect with performance is connected to both benefits and costs. On the one hand, team members might benefit from rewarding the performance of others with respect, because an increase in the performance of others might ultimately benefit themselves and the team. On the other hand, showing respect for the performance of others can come at the costs of lowering one's own status in the team and reduced social integration. We expect that individuals will only reward the performance of their colleagues with respect when they perceive that the potential benefits outweigh the potential costs. We discuss next how task interdependence and informal interdependence might

affect these costs and benefits.

4.2.2 Interdependence and status conferral in teams

Interdependence is a defining element of organizational teams, but the exact amount and form of interdependence that team members experience can vary widely, even between teams that have to fulfill similar tasks under similar organizational conditions (Taggar & Haines, 2006; Van der Vegt, Emans, & Van de Vliert, 2001; Wageman & Gordon, 2005). Accordingly, a large body of research has examined how variations in different forms of interdependence affect team member behavior and team level outcomes (for an overview see Van der Vegt & Van de Vliert, 2002). Interestingly, this literature has not addressed how the degree and form of interdependence affects the status-performance link in teams. Our focus is on task interdependence and informal interdependence as two central forms of interdependence that might moderate this link.

4.2.2.1 Task interdependence

Task interdependence is "the connectedness between jobs such that performance of one depends on the successful performance of the other" (Kiggundu, 1983, p. 146). The level of task interdependence that team members experience is to some extent defined by managerial requirements and demands of the task (Brass, 1985), but teams often have considerable leeway in coordinating their work. In the extreme case, management defines nothing more than who belongs to the team and what goals need to be achieved, and leaves it to the team how to organize its work (cf. Barker, 1993). In such self-managing teams, the interdependence that develops is fully emergent and is likely to reflect skills, experiences, and personality dispositions of team members (Wageman & Gordon, 2005).

The interdependence that a given team member experiences can be distinguished into initiated task interdependence and received task interdependence (Kiggundu, 1981, 1983; Taggar & Haines, 2006; Van der Vegt, Emans, & Van de Vliert, 1998). Initiated task interdependence is the degree to which a team member's work and performance affects the work and performance of others. Team members high in initiated task interdependence have many other team members relying on them for material, information, and advice (Taggar & Haines, 2006). Those other team members tend to develop a sense of responsibility for the work of the initiator, which often leads to high motivation and a generally positive job perception (Van der Vegt et al., 1998). Received task interdependence, by contrast, is the degree to which a team member depends on the work and performance of others. Team members high in received task interdependence are likely to experience little autonomy in their jobs and are likely to perceive that their success at work largely depends on the efforts of others (Doerr et al., 2004).

In this chapter, we focus on received task interdependence, due to its potential effect on the benefits that individuals might derive from motivating other team members to perform well. Given this effect, we expect that the level of received task interdependence (for brevity from here on simply called 'task interdependence') that team members experience is a moderator in the relation between status and performance. The more a given team member depends on the

task performance of others, the less likely they will perceive that their own efforts alone are sufficient to be successful in her work and the more they assume to gain from motivating others to perform at high levels. However, the less they depend on the task performance of others, the less they stand to gain from conferring status to them. Consequently, high (low) received task interdependence should increase (decrease) team members' willingness to reward performance with respect. We therefore formulate our first hypothesis as:

> *Hypothesis 1: Task interdependence will moderate the relation between respect and performance. The more a team member experiences task interdependence, the more this team member will respect other team members for their performance.*

4.2.2.2 Informal interdependence

Task interdependence refers to the formal, task focused relations that exist among team members. Informal interdependence, by contrast, refers to the "personal relationships between team members [...] that are independent from the formal positions they have" (Koster et al., 2007, p. 120). Informal interdependence is high when team members frequently socialize outside work, maintain friendly relations, discuss personal matters, and provide each other with social support. Dense informal ties among co-workers have been assumed to have beneficial effects for both individual employees and the larger organization, and have been conceptualized as a form of social capital that individuals can draw upon (Jones & George, 1998; Leana & van Buren, 1999; Spagnolo, 1999). In line with this notion, Koster et al. (2007) highlighted that strong personal relations have been shown to facilitate access to information, idea exchange, emotional support, and subjective well-being among organizational members.

Given the social capital that can reside in strong personal relations, individuals tend to engage in acts that facilitate such relations and tend to avoid acts that might undermine them. Such behaviors can even occur at the cost of performance. For example, Flache and Macy (Flache & Macy, 1996; Flache, 1996) argued that when individuals value good social relations with their colleagues, they can be inclined to divert time and resources to behaviors that aim at promoting and maintaining strong dyadic bonds with others, rather than focusing on team performance. In line with this, Langfred (2004) has shown that in teams in which there exists a high level of mutual trust among team members, individuals are less likely to monitor the work of others to avoid undermining the existing trust. This reluctance even occurs at the cost of decreased team performance.

As indicated earlier, status differentiation tends to create barriers to social interactions and can cause tensions that might lead to the deterioration of social ties among group members. Given that individuals tend to value strong social bonds with their peers, we might expect that team members who experience higher levels of informal interdependence will be less likely to make their regard for others contingent on their performance. We thus formulate our second hypothesis as:

> *Hypothesis 2: Informal interdependence will moderate the relation between respect and performance. The more a team member experiences informal*

interdependence, the weaker will be the effect that the performance of others has on the respect that this team member has for them.

4.3 The Current Study

4.3.1 Sample and procedure

We tested our hypotheses with longitudinal data collected at two time points at four locations (from here on departments) of a medium-sized Dutch childcare organization. The departments operated independently of each other but shared a focus on treating non-institutionalized children with special social and psychological needs (from here on clients). The departments consisted of 16 to 42 staff members who either were directly involved in treating clients or had supportive functions (e.g., administrative personnel).[12] Staff members concerned with treating clients could be further categorized into social workers and a smaller number of employees with specialized functions (e.g., medical doctors, speech therapists, and play therapists). Social workers worked in teams of two to five members that were jointly responsible for 8 to 16 children. Our analysis focuses on the respect among the members of these teams.

Within teams, mentoring roles were assigned so that certain tasks with particular children were the responsibility of only one team member. Apart from this, the work in the teams was self-managed and team members had to organize who would take care of which children over the course of a week and what group activities would be organized. This aspect of self-organization makes these teams particularly attractive for our study, because it creates a situation in which the organizational context is constant, whereas the exact way in which the work is structured might vary between teams.

Table 4.1 provides an overview of the size of the different teams, participation rates, and turnover between the two time points. In total, there were $N = 66$ social workers of which $n = 55$ participated in the study at least once (83% participation rate). Between Time 1 and Time 2, 16 employees left their teams, either because they left the organization, started working in different functions, or because they switch to other teams. One team ceased to exist between Time 1 and Time 2 and total of 18 employees joined the teams.

Data collection took place by means of paper-and-pencil questionnaires distributed in spring and autumn 2011. The questionnaires consisted of two parts. The first part had a round robin design which asked respondents to evaluate the other members of their department on several characteristics. The second part consisted of respondents' self-ratings on various social-psychological measures and questions about demographic characteristics. As we discuss in detail below, our central dependent variable was the amount of respect that a given respondent (i.e. *actor*) indicated to have for a given member of their team (i.e. *target*). We aimed to predict this variable with the performance in client directed tasks that actors attributed to the targets, contingent on the task interdependence and informal interdependence that actors reported experiencing.

[12] Department sizes in detail (Time 1/Time 2): 16/19, 40/42, 19/16, 34/39.

Department/Team	Time 1			Time 2			Turnover	
	N	*n*	(%)	*N*	*n*	(%)	*left*	*joined*
Total	52	46	(88)	54	38	(70)	16	18
Department 1	7	7	(100)	6	5	(83)	2	1
Team 1	4	4	(100)	3	3	(100)	1	0
Team 2	3	3	(100)	3	2	(66)	1	1
Department 2	17	15	(88)	21	12	(57)	3	7
Team 3	4	3	(75)	4	3	(75)	1	1
Team 4	3	2	(66)	4	3	(75)	1	2
Team 5	4	4	(100)	4	1	(25)	0	0
Team 6	3	3	(100)	4	3	(75)	1	2
Team 7	3	3	(100)	5	2	(40)	0	2
Department 3	11	9	(81)	8	6	(75)	6	3
Team 8	5	4	(80)	3	1	(33)	3	1
Team 9	2	1	(50)	–	–		2	0
Team 10	4	4	(100)	5	5	(100)	1	2
Department 4	17	15	(88)	19	15	(78)	5	7
Team 11	2	2	(100)	4	3	(75)	1	3
Team 12	5	4	(80)	5	5	(100)	3	3
Team 13	4	3	(75)	3	1	(33)	1	0
Team 14	3	3	(100)	3	2	(66)	0	0
Team 15	3	3	(100)	4	4	(100)	0	1

Table 4.1 Department and team sizes, participation rates, and turnover. *N* = number of employees, *n* = number of employees who participated, and % = participation rate. Team 9 had been dissolved between Time 1 and Time 2. Four respondents switched teams between Time 1 and Time 2, therefore the number of employees is larger than the sum of the numbers of team members.

4.3.2 Measures

4.3.2.1 Respect

We asked respondents to indicate how much they respected the members of the department relatively to each other. They could indicate this respect on a 5-point Likert-type scale, ranging from 'much lower than average' (1) to 'much higher than average' (5). We developed this question based on earlier research on status allocations in organizational contexts (cf. Flynn, 2003). The comparative nature of the measure takes into account that status is a zero-sum commodity, so that high status derives from being relatively more respected than others.

4.3.2.2 Performance

We asked respondents to evaluate the performance of the other members of their department in terms of client directed tasks. Similar to our measure of respect, employees could evaluate the performance of their colleagues on a 5-point Likert-type scale, ranging from 'much lower than average' (1) to 'much higher than average' (5) (cf. Barrick & Mount, 1993; Kohli, Shervani, & Challagalla, 1998). We relied on a subjective measure of performance, instead of an objective measure, for two reasons. First, the tasks that respondents had to fulfill were

complex and highly non-standard, which makes it difficult to devise objective performance measures. Second, status scholars have highlighted that what matters most for status processes is perceived performance and contributions to collective goals, which might or might not be aligned with objective performance measures (Anderson & Kennedy, 2012; Berger, Cohen, & Morris, 1972; Ridgeway, 1991). We relied on relative performance evaluations because this was likely to make performance differences between department members more salient.

4.3.2.3 Task interdependence

We assessed respondents' perceptions of their dependence on other colleagues for fulfilling their tasks with one item from Van der Vegt et al.'s (2001) task interdependence scale. Employees could indicate on a 7-point Likert-type scale how much they depended on their colleagues for doing their own work, ranging from 'not at all' (1) to 'very much' (7).

4.3.2.4 Informal interdependence

Based on earlier research on informal interdependence (Koster et al., 2007), we operationalized the level of informal interdependence that respondents experienced with each of their colleagues by asking them to describe their relations with them on a 5-point Likert-type scale, ranging from 'very difficult relation' (1) to 'good friend' (5).

4.3.2.5 Control variables

We included information about respondents' gender (dummy coded with 'female' (1), 'male' (0)), age and tenure (both measured in years), weekly working hours, and employment status ('intern' (1), 'employee' (0)) in the analysis. We expected that each of these attributes might affect status allocations for reasons other than performance. For example, age, tenure, and working hours might be correlates of experience that might command respect in the eyes of others, even if it is not strongly related to current individual performance. Men might act more dominantly than women in teamwork, which might elicit respect among others, even if this is unrelated to performance. Additionally, the temporally limited role and learning role of interns might generally diminish the respect they receive within a team. Note that interns were present in some teams only at Time 1 and only in some of the teams.

4.3.3 Analytical approach

Our data had a complex multilevel structure in which status conferrals were nested in time points, actors, targets, dyads, and teams, which violates assumptions of independence of most standard statistical methods. We therefore used the social relations model (Kenny & La Voie, 1984) for analyzing our data. The social relations model decomposes the variation in the observed status conferrals into time, actor, target, dyad, and team variance (Back & Kenny, 2010). Time variance captures variation in status conferral behavior between the two time points of data collection; actor variance captures variation due to differences in the status conferral behavior between individuals (i.e. actor variance is high when some individuals generally grant more/less respect to their colleagues than other team members); target variance

	Variable	Time 1		Time 2	
		M	*SD*	*M*	*SD*
1.	Actor Female	.94	.24	.96	.18
2.	Actor Age	34.51	10.17	35.45	9.39
3.	Actor Tenure	8.57	7.53	9.83	8.12
4.	Actor Hours	26.68	6.09	24.60	5.82
5.	Actor Intern	.14	.35	–	–
6.	Target Female	.93	.25	.96	.18
7.	Target Age	35.21	9.89	35.21	9.33
8.	Target Tenure	8.91	7.40	9.65	8.22
9.	Target Hours	26.96	6.43	25.17	6.95
10.	Target Intern	.10	.30	–	–
11.	Task-Int	5.58	.85	5.39	.93
12.	Informal-Int	3.82	.70	3.86	.67
13.	Perf	3.56	.68	3.53	.71
14.	Respect	3.53	.65	3.49	.69

Table 4.2 Means and standard deviations of study variables.

captures differences in the status that individuals generally receive (i.e. target variance is high when some individuals generally are more/less respected than other individuals); dyad variance captures variation in allocations between particular pairs of individuals (i.e. dyad variance is high when two individuals grant more/less respect to each other than other individuals grant to them); team variance, finally, captures general differences in the status allocations between teams (i.e. team variance is high when members of one team have a tendency to grant more respect to each other than the members of other teams grant to each other).

The estimation of social relations models starts with a null-model that does not contain any predictor variables; this model serves both variance partitioning and as a baseline model against which the fit of subsequent models that contain predictor variables can be compared. In our case, the first subsequent model (Model 1) contained all control variables and main predictor variables; in the second subsequent model (Model 2) we added two multiplicative interaction terms, one for the interaction between perceived performance and task interdependence and one for the interaction between perceived performance and informal interdependence. The inclusion of these two-way interactive terms enabled us to test our hypotheses.

A social relations model has one observation for each dyad of individuals with information from the side of the actor at a given time point (i.e. two observations when individuals 1 and 2 evaluate each other; only one when, e.g., individual 1 evaluates individual 2, but individual 2 refuses to participate). To deal with the possibility of missing evaluations, we conducted all analyses with the `lme4` package (Bates, Maechler, Bolker, & Walker, 2015) in the statistical software environment R (R Core Team, 2014). This package let us estimate multilevel models with appropriate cross-classification of observations across the five levels (time points, actors, targets, dyads, and teams), while allowing for missing observations.

In each dyad, we had information about the characteristics of the actor and the target. This enabled us to assess how the control variables affected status allocations as properties of both actors and targets.

4.4 Results

4.4.1 Descriptive statistics

Table 4.2 presents the descriptive statistics for all study variables at the observation level and Table 4.3 shows bivariate correlations. In total, we obtained 231 observations (Time 1 = 117; Time 2 = 114). At both time points, respondents perceived to depend on their colleagues for doing their work (M_{T1} = 5.58, SD_{T1} = .85; M_{T2} = 5.39, SD_{T2} = .93) and experienced some level of informal interdependence (M_{T1} = 3.82, SD_{T1} = .70; M_{T2} = 3.86, SD_{T2} = .67). Respondents tended to evaluated the performance of the other team members as average or above average (M_{T1} = 3.56, SD_{T1} = .68; M_{T2} = 3.53, SD_{T2} = .71) and tended to respect them similarly or more than all other members of the department (M_{T1} = 3.53, SD_{T1} = .65; M_{T2} = 3.49, SD_{T2} = .69).

In terms of bivariate correlations, at both time points respect was positively correlated with performance evaluations (r_{T1} = .60, $p \leq .01$; r_{T2} = .44, $p \leq .01$) and informal interdependence (r_{T1} = .38, $p \leq .01$; r_{T2} = .47, $p \leq .01$), but with task interdependence only at Time 1 (r_{T1} = .20, $p \leq .05$; r_{T2} = .04, *ns*).

4.4.2 Variance partitioning

Table 4.4 presents the partitioning of variance in respect allocations of the time, actor, target, dyadic, and team level of analysis. Of the non-residual variance, about 10% was at the actor level, 15% was at the target level, 25% was at the dyadic level, and 49% was at the team level. The variance across time points was negligible. This indicates that most of the variation in status allocations was specific to teams and dyads of team members, while some respondents differed from others in how much status they generally conferred and/or how much status they generally received.

4.4.3 Hypothesis testing

Hypothesis 1 predicts that task interdependence moderates the relation between performance evaluations and status allocations. The results shown in Table 4.5 (Model 1) suggest that performance evaluations were positively associated with status allocations (b = .315, $p \leq .01$). Upon entering the two-way interactive effects (Model 2), the main effect of task interdependence became significant at the 1% level (b = .116, $p \leq .01$). In line with our hypothesis, the two-way interactive effect between task interdependence and performance evaluations was positive and significantly (b = .124, $p \leq .05$). Figure 4.1 illustrates that this implies that respondents who experienced relatively higher levels of task interdependence granted more respect for performance than respondents who experienced relatively lower levels of task interdependence.

	Variable	1		2		3		4		5		6		7	
1.	Actor Female	—		-.29	**	-.33	**	-.33	**	.10		.07		-.20	*
2.	Actor Age	-.44	**	—		.82	**	-.26	**	-.49	**	-.06		.08	
3.	Actor Tenure	-.33	**	.86	**	—		-.16	†	-.40	**	-.07		.20	*
4.	Actor Hours	-.44	**	.14		.10		—		.35	**	-.07		.14	
5.	Actor Intern	—		—		—		—		—		-.29	**	.19	*
6.	Target Female	-.04		-.08		-.14		.26	**	—		—		-.37	**
7.	Target Age	-.23	*	.28	**	.30	**	-.12		—		-.43	**	—	
8.	Target Tenure	-.29	**	.31	**	.32	**	-.10		—		-.33	**	.88	**
9.	Target Hours	.08		-.07		-.02		-.21	*	—		-.35	**	.17	†
10.	Target Intern	—		—		—		—		—		—		—	
11.	Task-Int	.08		-.02		.05		.17	†	—		.24	*	-.25	**
12.	Informal-Int	-.04		.04		.00		.15		—		.10		-.07	
13.	Perf	-.06		.20	*	.20	*	.30	**	—		.01		.11	
14.	Respect	-.14		.29	**	.30	**	.17	†	—		.00		.13	

Table 4.3 Part I Intercorrelations between study variables. Correlations for Time 1 appear above the diagonal; correlations for Time 2 appear below the diagonal. Two-tailed significance levels: ** $p \leq .01$, * $p \leq .05$, † $p \leq .1$.

	Variable	8		9		10		11		12		13		14	
1.	Actor Female	-.22	*	.02		-.15		.05		-.12		-.06		-.24	**
2.	Actor Age	.20	*	.00		.12		-.11		-.02		.01		.17	†
3.	Actor Tenure	.28	**	-.02		.02		-.12		.00		.06		.13	
4.	Actor Hours	.14		-.09		-.06		.08		-.01		.03		.04	
5.	Actor Intern	.08		.09		.03		.08		-.11		.12		-.06	
6.	Target Female	-.42	**	-.37	**	.09		.03		-.17	†	-.28	**	-.09	
7.	Target Age	.81	**	-.19	*	-.44	**	-.12		-.04		.27	**	.19	*
8.	Target Tenure	—		-.14		-.36	**	-.09		.11		.32	**	.24	**
9.	Target Hours	.13		—		.27	**	.04		.01		-.12		-.16	†
10.	Target Intern	—		—		—		.00		.09		-.24	**	-.10	
11.	Task-Int	-.26	**	.03		—		—		.06		.06		.20	*
12.	Informal-Int	.01		-.08		—		.09		—		.27	**	.38	**
13.	Perf	.14		-.15		—		.03		.47	**	—		.60	**
14.	Respect	.17	†	-.26	**	—		.04		.47	**	.44	**	—	

Table 4.3 Part II Intercorrelations between study variables. Correlations for Time 1 appear above the diagonal; correlations for Time 2 appear below the diagonal. Two-tailed significance levels: ** $p \leq .01$, * $p \leq .05$, † $p \leq .1$.

Hypothesis 2 predicts that informal interdependence moderates the relation between performance evaluations and status allocations. The results shown on Table 4.5 do not support this hypothesis. Informal interdependence positively affects respect in Model 1 (b = .244, $p \leq$ .01) but does not act as a moderator in the relation between performance and respect in Model 2 (b = -.093, *ns*), although the coefficient is in the expected direction. That is, as Figure 4.2 illustrates, respondents who experienced relatively higher levels of informal interdependence with their colleagues tended to grant somewhat less respect for performance to them, but this decrease was not significant.

Source of variance	Estimate	
Team	.083	49%
Dyadic	.043	25%
Actor	.017	10%
Target	.026	15%
Time	<.001	<1%
Residual	.301	
Deviance	451.15	

Table 4.4 Variance partitioning for respect allocations.

Variable	Model 1			Model 2		
	Estimate		*SE*	*Estimate*		*SE*
Intercept	3.638	**	0.304	3.654	**	0.307
Control variables						
Actor Female	-0.215		0.206	-0.176		0.205
Actor Age	0.005		0.007	0.004		0.007
Actor Tenure	0.013		0.009	0.016	†	0.009
Actor Hours	0.005		0.007	0.010		0.007
Actor Intern	-0.030		0.182	-0.079		0.183
Target Female	0.125		0.201	0.088		0.202
Target Age	0.000		0.008	-0.001		0.008
Target Tenure	0.013		0.010	0.013		0.010
Target Hours	-0.005		0.006	-0.004		0.006
Target Intern	-0.085		0.193	-0.108		0.193
Main effects						
Task-Int	0.101	*	0.041	0.116	**	0.041
Informal-Int	0.244	**	0.060	0.228	**	0.059
Perf	0.315	**	0.058	0.300	**	0.058
Two-way interactions						
Task-Int × Perf				0.124	*	0.063
Informal-Int × Perf				-0.093		0.063
$\Delta\chi^2(df)$	109.38 (13) **			6.232 (2) *		

Table 4.5 Social relations model analyses for respect allocations. Two-tailed significance levels: ** $p \leq .01$, * $p \leq .05$, † $p \leq .1$.

4.5 Discussion and Conclusion

In this chapter, we examined the conditions under which members of organizational teams reward the performance of their colleagues with status in the form of respect. Earlier research suggests that in team settings, individuals use respect as a selective incentive to motivate their colleagues to perform well and to contribute to the collective goals of the team. The results of our analyses suggest that this reward mechanism is not as universal as previously thought. Specifically, in line with our theoretical arguments, our results suggest that individuals are the more likely to reward the performance of other team members with respect, the more they perceive that the successful completion of their own tasks depends on the performance of

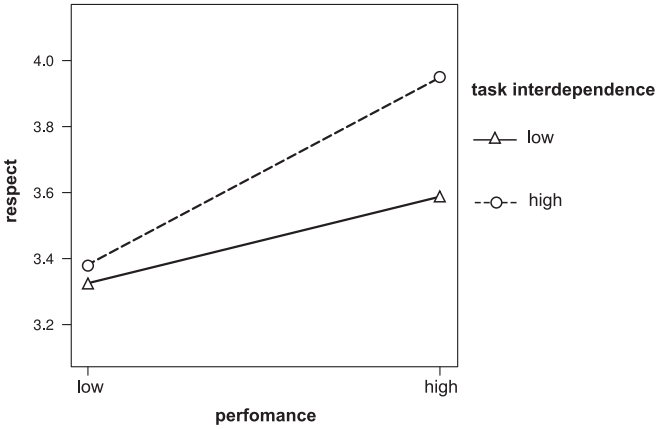

Figure 4.1 Two-way interactive effects of performance perceptions and task interdependence on respect conferral.

others. However, when individuals perceive that the completion of their own tasks depends little on the performance of others, they are less likely to reward their performance with respect. Existing research has so far largely neglected to control for the task interdependence that team members experience and might thereby miss an important boundary condition for the emergence of status differentiation.

Our results also suggest that high levels of informal interdependence in teams leads to increased respect among team members, but it does not moderate the relation between performance and respect. We argued that making the regard for others contingent on performance is potentially a costly act, because it can lead to competition and tensions, which might undermine the personal social relations that might exist in a team. In the outcomes of our analyses, individuals who experienced high levels of informal interdependence with their colleagues were not more or less likely to make their regard for these colleagues contingent on their performance than individuals who experienced lower levels of informal interdependence. Thus, the mechanisms that link respect with performance seem to be largely unaffected by the social relations that exist in a given team. One reason might be that respondents shared a very strong task focus, which might render the delivery of high quality care the central frame for their relations with other team members. If such a task focus is very dominant, other motives (e.g., concerns for friendship and social support) might become secondary for individuals' willingness to reward performance with respect (cf. Berger et al., 1977). Indeed, our experiences during the preparatory interviews with organizational members suggest that most individuals shared a very strong task focus and were strongly committed to their work with their clients. In other organizations in which such commitment is weaker and varies more among employees, informal interdependence might be a more important factor in the status allocation process.

A central strength of our study is that we collected repeated measurements of status allocations. This made it possible to separate measurement error in status allocations from

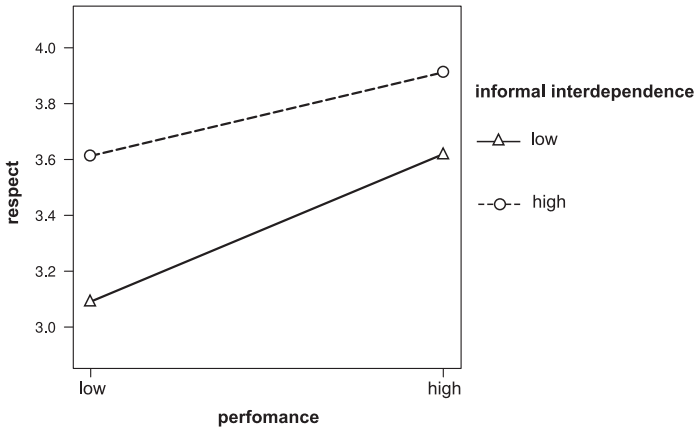

Figure 4.2 Two-way interactive effects of performance perceptions and informal interdependence on respect conferral.

possible dyadic processes that affect the attribution process. The means, standard deviations, and intercorrelations were very stable between the two time points of data collection, which underscores the robustness of the processes that we were interested in. Additionally, because we collected status allocations and performance evaluations using sociometric techniques and analyzed these data with the social relations model enabled us to control for possible interdependence and complexity in status allocations.

Our study shows how different forms of interdependence affect status differentiation in organizational teams. Future research can build on and extend our work in several ways. First, we captured each of our central measures with a single item. For our sociometric measures (i.e. respect, performance evaluations, informal interdependence), this approach is in line with much existing research that has used dyadic data. One advantage of this approach is that it is likely to reduce fatigue in respondents, particularly in round robin designs that involve many targets, as was the case in our research (cf. Pustejovsky & Spillane, 2009). Earlier research has suggested that single-item measures can be reliable if they are sufficiently narrow and meaningful for respondents (Sackett & Larson, 1990). In developing our survey, we pretested extensively and discussed the questions (especially those involving a round robin design) with members of other departments not involved in the survey. Based on these discussions, we developed formulations perceived as meaningful by organizational members. Nevertheless, future research might benefit from using multiple measures for some of the variables that we studied, thereby increasing the reliability of the assessment of central theoretical constructs.

Our central measures were based on responses by study participants. At least in the cases of performance and task interdependence, it could have been possible to gather data from other sources, to try to reduce common source bias. For example, in the case of performance, we might have collected the department heads' performance evaluations of study participants. Similarly, in the case of task interdependence, we might have tried to develop measures aimed at objectively quantifying the amount of task interdependence within teams. In the context of

our study, however, there are several important drawbacks to such apparently more objective sources. First, the way employees perceive task interdependence in their teams might differ from what we expect if we look at the formal requirements. In the case of self-managing teams, obtaining external measures of task interdependence might be close to impossible. Thus, using respondents' reports of task interdependence is likely to be more reliable in assessing the level of task interdependence that individual team members experience. Second, measuring performance objectively can be very difficult, especially for complex and non-standard tasks, such as social work. Even supervisors' evaluations might not be reliable, given that they tend to be highly subjective. Thus, using respondents' perceptions of the performance of others is likely to be more reliable for the purposes of our study. Still, future research could try to collect more objective measures of performance and task interdependence and assess how such measures are related to the status processes described here.

Finally, we focused only on teams in one organizational context. Among these teams, the variation in the task interdependence and informal interdependence that individuals experienced was comparatively low. Our analyses suggest that already this comparatively small variation in task interdependence was significantly related to status allocations. However, future research might find even stronger effects than we report here, when a more diverse sample is used.

Together, our results suggest that in team settings, individuals' willingness to grant status to those who perform well is not as universal as previously assumed in research within the functionalistic perspective on status differentiation. Future research might thus benefit from considering the level of task interdependence that study participants experience as a boundary condition when studying status processes in organizational teams.

Chapter 5

Status Generalization, In-Group Favoritism, and Ability Attributions: A Network Study Among Adolescents*

Abstract

Earlier experimental research in status characteristics theory suggests that status characteristics can induce status generalization that affects individuals' assumptions about each other's abilities. However, earlier research has examined status generalization predominately in laboratory settings, with groups that had a strong collective task focus. In this chapter, we contribute to existing field research and explore in-group favoritism as an alternative mechanism that might undermine status generalization processes in the field, in groups without a strong collective task focus. We study the effects that the status characteristics gender and ethnicity have on ability attributions with exponential random graph models that we apply to data collected among adolescents in 27 Hungarian school classes. Our results suggest that across classes, gender does not consistently affect ability attributions and that ethnicity affects ability attributions through status generalization, but not in-group favoritism.

*This chapter is co-authored with Károly Takács and Judit Pál and at time of writing was in preparation for re-submission to a scientific journal.

5.1 Introduction

Social distinctions with status value in society, such as gender, age, and race, can shape individuals' expectations about each other (Berger et al., 1972). *Status generalization* occurs when such characteristics affect assumptions about abilities and skills. In the USA, for example, men still have a status advantage over women (Hopcroft, 2002) and male job applicants are therefore often perceived as more able and competent than female applicants, even if they have the same formal qualifications (Moss-Racusin et al., 2012).

A large body of research in *status characteristics theory* (Berger et al., 1977) has examined conditions under which salient status characteristics affect assumptions about individual abilities in small group contexts and thereby affect group member interactions (for a review see Wagner & Berger, 2002). Studying status generalization in such contexts is particularly important, because small groups can contribute to the reproduction of social inequality. When lower status individuals repeatedly make the experience that other group members believe that they lack important abilities, they might experience strain that can undermine cognitive performance. This, in turn, can reinforce existing stereotypes (cf. Steele & Aronson, 1995).

Some scholars emphasize that existing research on status generalization is limited by its almost exclusive focus on ad hoc created experimental groups with a strong collective task focus (B. P. Cohen & Zhou, 1991; Martin, 2009). Groups with a collective task focus (such as work teams) are important building blocks of society and certainly play a significant role in both shaping and re-enforcing status differentiation and social inequality. However, many group settings do not have a collective task focus yet still play a significant role. While there is some first experimental evidence that status generalization affects ability attributions in settings without a collective task focus (e.g., Foschi et al., 1994), we still know little about how status characteristics affects ability attributions in such groups outside the laboratory.

This chapter adds to the few studies on status generalization, exploring an alternative mechanism that might undermine status generalization processes in the field, in groups that lack a strong collective task focus. Specifically, field research based on status characteristics theory has assumed that status generalization affects the ability attributions of members of status-advantaged and status-disadvantaged categories similarly, given their goal to coordinate their work on some collective task (cf. B. P. Cohen & Zhou, 1991; York & Cornwell, 2006). In this view, when gender is a status characteristic that favors men over women, both men and women tend to attribute higher abilities to men. By contrast, recent experimental research in *social identity theory* (Tajfel & Turner, 1979) suggests that a need for positive self-esteem can induce *in-group favoritism* that leads status beliefs to affect members of status-advantaged and disadvantaged categories differently (Oldmeadow & Fiske, 2010). In this view, men tend to attribute higher abilities to other men but women tend to reject such differences and attribute equal abilities to men and women. If in-group favoritism indeed affects ability attributions, we might not find a uniform effect of status characteristics.

We do not claim to be the first to recognize that in-group favoritism might affect status generalization. Several studies consider the possible effects of in-group favoritism and suggest that the two processes might combine to some extent (cf. Foschi et al., 1994; Oldmeadow et al.,

2003). However, to date the relative importance of the two processes has not been examined in the field and in groups that lack a strong collective task focus. Insights from existing research might not hold in this context given that in field settings, individuals can interact repeatedly with each other over a longer period. During these interactions, they might learn about each other's actual abilities, which might undermine effects of ability stereotypes based on status characteristics. Conversely, during such interactions individuals might also learn about more subliminal sources of similarity/dissimilarity in the group, which might undermine in-group perceptions based on status characteristics; this might undermine in-group favoritism based on status characteristics. Alternatively, the lack of a strong collective task focus might render individuals more inclined to base their ability attributions on the goal to maintain a positive self-image, rather than the goal to assess the abilities of others accurately.

In this chapter, we study the effects that gender and ethnicity have on ability attributions with data collected among adolescents in 27 Hungarian school classes. Gender and ethnicity, known as fundamental dimensions of social differentiation, are often important sources of status and social identity (cf. Levin, Sidanius, Rabinowitz, & Federico, 1998; Rashotte & Webster, 2005; Schmader, 2002) and are also among the most important determinants of homophilic friendship choice (McPherson, Smith-Lovin, & Cook, 2001). The class context enables us to study their effects on ability attributions in naturally occurring groups.

Studying ability attributions in such groups is complicated in that attributions might not be statistically independent. For example, group members might to some extent be aware of the abilities that other group members attribute to each other and this might affect their own attributions. This problem has been neglected in earlier field research in status characteristics theory. We deal with this problem by using a novel approach to studying ability attributions. We use exponential random graph (ERG) models, conceptualizing ability attributions as *network ties* among the members of a given class. ERG models enable us to assess how much the structure of these networks might be driven by status generalization and in-group favoritism, while controlling for statistical interdependence of the attributions in a given class.

In what follows, we first describe the central assumptions of status characteristics theory and social identity theory and present the competing hypotheses that they lead to. Next, we describe the data and our analytical approach. We close the chapter by presenting our results and discussing their implications for future research.

5.2 Status Differences, Similarity, and Ability Attributions

5.2.1 Status characteristics theory and status generalization

Status characteristics theory is part of the expectation states framework (for overviews of the framework see Correll and Ridgeway 2003 and Wagner and Berger 2002) and explains how *status characteristics* affect the abilities that people expect others to possess. A status characteristic is any social distinction that separates individuals into at least two categories connected to (1) widely shared beliefs about social worth and (2) beliefs about the possession of general and specific abilities, such as mathematical understanding and intelligence, that enable people to perform well in a wide range of tasks (Berger et al., 1972, 1977). For

simplicity, from here on we refer to such beliefs as *status beliefs* (cf. Ridgeway, 1991).

The theory holds that status generalization can occur whenever individuals feel pressured to engage in comparative ability assessments (Correll & Ridgeway, 2003). If individuals meet each other in a group context with a strong collective task focus (e.g., in work teams in which team members have to jointly solve a certain problem), status generalization occurs because group members somehow need to coordinate their work on the task based on cues they have about the relative abilities of the different group members. Yet, as Correll and Ridgeway highlighted, status characteristics should affect ability attributions whenever individuals have to engage in comparative ability evaluations, even when there is no collective task, because:

> "… [t]he anticipation of [a comparison] creates a pressure for actors to assess their task competence relative to others who they imagine are also being or have been evaluated. This coordination of rank position requires evaluating oneself in relation to the social environment. However, the standards for what constitutes a competent performance are not usually clearly defined beforehand, and others' precise scores are rarely known. In this uncertain environment, salient status characteristics are available to influence performance expectations, as they do in collective task situations. Through the process of status generalization, individuals develop performance expectations for themselves that are consistent with their state on the salient status characteristic." (Correll & Ridgeway, 2003, p. 47)

We therefore expect that status generalization occurs even in group contexts without a collective task focus.

Regardless of the presence of a collective task focus, status generalization should be most likely to occur among people with no first-hand knowledge about each other's abilities who thus can only rely on competence stereotypes associated with salient status characteristics to evaluate each other (cf. Webster & Foschi, 1988). This does not imply, however, that status generalization is always a conscious process in which people actively draw on existing status beliefs. Instead, "most instances of status generalization occur outside the realm of conscious thought" (Webster & Foschi, 1988, p. 3). By that, status generalization tends to circumvent egalitarian attitudes and motives that otherwise might lead individuals to reject discrimination, even among those who are disadvantaged by existing status beliefs (Rashotte & Webster, 2005).

Face-to-face interaction might intervene in status generalization, given that individuals can potentially learn about each other's objective abilities, which might or might not be congruent with existing stereotypes. Yet, there are reasons to expect that status generalization can affect ability attributions even among individuals who have already interacted with each other in the past. One reason is that people tend to interpret ability relevant performances in line with existing expectations. In mixed-gender work groups, for example, the performance of women often receives lower evaluations than comparable performances of men (cf. Correll & Ridgeway, 2003). Consequently, even when members of low status groups perform a certain task well, such displays of ability might not have much effect on the abilities that other group members expect them to possess. A second reason is that existing stereotypes can create

cognitive strain among members of low status groups, especially when they have to perform tasks for which they are expected to perform badly. This strain can impair performance and thereby can lead to a reinforcement of existing stereotypes (Steele & Aronson, 1995).

Taken together. status characteristics theory leads to the prediction that when individuals are forced to evaluate the abilities of others in a comparative situation, members of both status-advantaged and status-disadvantaged categories will attribute higher abilities to members of the status-advantaged category than to members of the status-disadvantaged category. This effect potentially holds even in groups where individuals engage in repeated face-to-face interaction and groups lacking a strong collective task focus.

5.2.2 Social identity theory, status differences, and in-group favoritism

Social identity theory (Tajfel & Turner, 1979) is a theory of intergroup cognition and behavior (for an overview of the theory and a discussion of its extension into self-categorization theory see Hornsey, 2008). It explains how individuals' identification with salient social groups affects the way they evaluate and treat people who belong to their own and other social groups. The theory builds on two central assumptions. First, people have both a personal identity, based on individual idiosyncrasies, and a social identity based on membership in salient social groups (Tajfel & Turner, 1979). Individuals can have multiple social identities given that they can be members of multiple groups at the same time. Each identity is associated with perceptions of in- ('us') and out-groups ('them') based on similarity in the underlying criterion (Hogg, 2006). Depending on which identity is salient, in- and out-group boundaries can vary.

Second, people strive for positive social identities and engage in behaviors that create or maintain them (Tajfel & Turner, 1979). In particular, they evaluate in-groups more positively than relevant out-groups (for reviews of research on in-group favoritism see Bettencourt et al. 2001, Brown 2000, and Hewstone, Rubin, and Willis 2002). Such discriminatory evaluation establishes favorable comparisons that elevate the in-group over out-groups and thereby can indirectly benefit individuals' self-esteem (cf. Foels, 2006; Hewstone et al., 2002; Lemyre & Smith, 1985; Oakes & Turner, 1980).

Social identity theory assumes that status differentiation between a salient out-group and in-group in favor of the former can constrain in-group favoritism (Tajfel & Turner, 1979). For members of high status groups (e.g., members of a prestigious college), ability stereotypes hold that they are more able and skilled than members of lower status groups (members of a less prestigious college) and such beliefs facilitate discriminatory evaluation that favors the high status in-group. For members of lower status groups, however, ability stereotypes hold that they are less able and skilled. Such beliefs render in-group favoring evaluation more tenuous, especially when status differences appear stable, impermeable, and derive from actual ability differences (cf. Dovidio, Gaertner, & Validzic, 1998; Ellemers, van Rijswijk, Roefs, & Simons, 1997). Oldmeadow and Fiske (2010) showed that one way to deal with this 'dilemma' is to downplay ability differences with higher status groups and exaggerate differences in dimensions irrelevant to status (e.g., emotional warmth). This reduces the threat to a positive identity but does not discard existing status beliefs entirely.

Status characteristics are often important axes around which social identities form. Social

identity theory therefore leads to the prediction that members of status-advantaged categories will attribute higher abilities to members of their own category than to members of status-disadvantaged categories. Members of status-disadvantaged categories, by contrast, will attribute similar abilities to members of both status categories. In groups that lack a collective task focus, the need to maintain a positive social identity might be more important than the need to evaluate the abilities of others accurately. This might lead in-group favoritism to dominate status generalization in such contexts.

5.3 The Current Study

Status characteristics theory and social identity theory lead to *similar predictions* about the attribution process among members of *status-advantaged categories*. However, they lead to *different predictions* about the attribution process among members of *status-disadvantaged* categories. We tested the theories' competing predictions with data collected in Hungarian secondary school classes. In the Hungarian educational system, classes are relatively closed units whose members mostly participate in the same courses and therefore spend most of their time together. This fact is likely to reduce interference from unobserved factors that might intervene in attribution processes.

We focused on the status characteristics gender and ethnicity. Gender is commonly considered one of the most important status characteristics with status value in many societies (cf. J. W. Balkwell & Berger, 1996; Ridgeway, 2011) and largely structures the organization of adolescent life (Coleman, 1961; Faris & Felmlee, 2011). In Hungary, gender is typically assumed to be a status characteristic that favors men over women and status differences show in many dimensions of social life such as political empowerment and economic participation (cf. Fodor & Balogh, 2010; Hadas, 2003; Nagy, 2006). We therefore defined male pupils as members of the status-advantaged category and female pupils as members of the status-disadvantaged category. In the USA, race is also an important status characteristic, particularly when it comes to differences between the white majority (status-advantaged) and the black minority (status-disadvantaged) (e.g., Steele & Aronson, 1995). Despite evident differences, ethnicity plays a similar role in Hungary (Kertesi & Kézdi, 2011). Roma are the largest ethnic minority in Hungary and are disadvantaged compared to the Hungarian majority in terms of employment, education and school performance, living and health conditions, and life expectancy (Kertesi & Kézdi, 2011; Messing, Neményi, & Zolnay, 2011). Roma people are often discriminated by negative judgments and Roma adolescents often conceive themselves as members of a stigmatized group (Neményi, 2007; Székelyi, Örkény, & Csepeli, 2001). We therefore defined Hungarian pupils as members of the status-advantaged category and Roma pupils as members of the status-disadvantaged category.

The central outcome of interest was pupils' attributions of cognitive abilities to other class members (from here on *ability attributions*), because such attributions are often assumed to represent assumptions about general abilities (e.g., Rashotte & Webster, 2005). Specifically, we examined how pupils' gender and ethnicity affected the likelihood that other class members attributed high cognitive abilities to them.

5.3.1 Sample and procedure

Data were collected in November 2010 as part of the project 'Wired into Each Other: Network Dynamics of Adolescents in the Light of Status Competition, School Performance, Exclusion, and Integration' conducted at the Research Center for Educational and Network Studies (RECENS). The data comprise information from pupils of 43 classes (in grade 9) from seven public schools distributed across Hungary. The sample purposively over-represented school classes with high Roma proportions.

The data were collected through a paper-and-pencil survey that pupils filled in at the same time in their classrooms. During data collection, at least one member of the research team was present to explain the procedure and answer questions. Participation was voluntary and required parents' permission. The average class size was 32.70 (SD = 3.71), ranging from 17 to 38. Of the initially listed N = 1406 pupils, n = 1214 participated in the study, leading to an overall response rate of about 86%. The average age of participants was 16.73 years (SD = 1.46), ranging from 14 to 22 years.

Across classes, the participation rate ranged from about 58% to 100%. A large share of missing cases in network data can lead to biased results (Kossinets, 2006), but excluding classes from the analysis based on any instance of survey non-response might reduce the sample of classes severely and this might reduce the generalizability of our results. To trade-off these conflicting concerns, we decided to only retain classes in which at most 20% of cases were missing, which left 27 classes with 812 respondents in total.[13]

Estimating the effects that status characteristics have on ability attributions among members of different status categories requires that each class has sufficient pupils belonging to each category. Thus, within the remaining 27 classes, we focused on those which had at least 20% of pupils belonging to either status-advantaged or status-disadvantaged categories. In some classes, this criterion was satisfied for gender but not for ethnicity and vice versa. Therefore, we conducted two analyses. In *Analysis 1*, we focused on those classes that had at least 20% of both male and female pupils and included variables related to ethnicity as controls in those classes in which this was possible. For this, 21 classes with a total of 648 pupils were eligible, with an average of 63% female pupils.[14] In *Analysis 2*, we focused on those classes that had at least 20% of both Hungarian and Roma pupils and included variables related to gender as controls in those classes in which this was possible. For this, 11 classes with a total of 306 pupils were eligible, with an average of 42% Roma pupils.

[13] A value of 20% missing cases is generally considered to represent a low amount of missing data in network studies and do not tend to affect results strongly (Huisman, 2009). This criterion led to the exclusion of 15 classes (leaving 28 classes). Subsequently, pupils indicating they were neither Hungarian nor Roma (18 pupils in total, see Section 5.3.3) were also treated as survey non-responses, because their relative status compared to Roma and Hungarian pupils was unclear. This led to the exclusion of one more class.

[14] Female students are overrepresented in the sample compared to the larger population, because in the highest track of the Hungarian educational system (the 'gimnázium' track), women are generally overrepresented. Men tend to be overrepresented in the vocational track; yet, the sample included two vocational schools that specialized in trade and commerce in which female students are in majority.

5.3.2 Analytical approach

We analyzed the ability attributions that occurred in the different classes with ERG models. In an ERG framework, ability attributions are modeled as a network among class members in which directed binary ties between two individuals *i* and *j* that can either be present (1 = *i* attributes abilities to *j*) or absent (0 = *i* does not attribute abilities to *j*; for details about how ability attributions were measured in the survey see Section 5.3.3). The parameter estimates that ERG models generate can roughly be interpreted like parameters in logistic regression analysis. This means that a positive (negative) parameter estimate for a given variable in the model implies that higher values on this variable make it more (less) likely that another pupil *j* attributes abilities to pupil *i*. ERG models enable us to estimate this likelihood, contingent on properties of *i* and *j* (i.e. *actor characteristics*, such as *i*'s and *j*'s gender and ethnicity), other relations that *i* and *j* share (i.e. *dyad characteristics*, such as when *i* considers *j* to be a friend, which might affects *i*'s ability attribution to *j*), and on other ties that surround *i*'s evaluation of *j* (i.e. *structural variables*).

Structural variables allow us to control for the possibility that ability attributions might be statistically interdependent within a given class. Consider, for example, a male pupil (say, Péter) who has managed to build a reputation for being particularly intelligent and therefore receives a large number of ability attributions from other class members. The remaining class members, both males and females, do not differ much in the number of attributions they receive. If we ignore the fact that the ability attributions that Péter receives all share the same target, we might find that male pupils are more likely to receive ability attributions than female pupils, even if this difference is due to the fact that (only) Péter receives a very large number of attributions. In ERG models, we can consider this possibility and therefore derive unbiased parameter estimates. In the appendix to this chapter (Section 5.6), we provide a detailed description of the way parameters are estimated in ERG models and discuss how we assessed the fit of our ERG models.

In an ERG framework, each class is treated as a separate, complete network for which a different set of parameter estimates is obtained. To assess whether a given variable is associated with ability attributions across the classes in our sample, we need to aggregate these estimates. Snijders and Baerveldt (2003) suggested that results from different classes could be treated as separate case studies that can be aggregated with standard meta-analytical procedures. Using their approach, we aggregated the parameter estimates across classes and report standard measures for meta-analyses (see the appendix to this chapter for details).

5.3.3 Measures

5.3.3.1 Ability attributions

The survey contained social network modules in which pupils were given a roster with the names of their classmates and were asked to indicate those whom they perceived to possess various attributes (e.g., 'has a good sense of humor' or 'is reserved'). We focused on pupils' attributions of the trait 'is clever/smart' as the dependent variable (i.e. 1 = *i* attributes abilities

to *j*, 0 = *i* does not attribute abilities to *j*).

5.3.3.2 Actor characteristics

Pupils were asked to indicate whether they were male or female. We used this information for three parameters in the analysis (see details in the appendix to this chapter). *Receiver female* indicates whether an attribution from *i* to *j* was more likely when *j* was female (coded as 1) than when *j* was male (coded as 0); *both female* indicates whether an attribution from *i* to *j* was more likely when both were female (coded as 1) compared to when they were both male or differed in gender (coded as 0); *both male* indicates whether an attribution from *i* to *j* was more likely when both were male (coded as 1) compared to when they were both female or differed in gender (coded as 0).

Pupils were asked to indicate whether they considered themselves Hungarian, Roma/Gypsy, Roma/Gypsy, and Hungarian at the same time, or to belong to another ethnic group. As mentioned earlier, pupils who indicated that they belong to another ethnic group were excluded from the analysis. We defined pupils who considered themselves Roma/Gypsy and Hungarian at the same time to belong to the category Roma/Gypsy (for simplicity called *Roma*). We decided to include pupils who indicated both ethnicities (143 out of 1214) in the category *Roma*, because these students are likely to be stigmatized due to their Roma/Gypsy origin. Of the 1214 pupils, 101 did not answer this question. For 83 of them we could impute their ethnicity from their answers to the same question in two later waves of this project (collected about 6 and 18 months after the first wave). For the remaining 18 pupils, we used a polynomial regression model to approximate their ethnicity.[15] Analogous to gender, we used information about pupils' ethnicity for three parameters in the analysis: *receiver Roma*, *both Roma*, and *both Hungarian*.

5.3.3.3 Dyad characteristics

We controlled for pupils' perceptions of two additional characteristics that earlier research has reported to affect ability attributions. First, we controlled for pupils' perceptions of each other's physical attractiveness, because physical attractiveness can be a status characteristic that favors more attractive individuals over less attractive individuals (Jackson et al., 1995; Parks & Kennedy, 2007). Second, we controlled for pupils' perceptions of each other's academic

[15] We used the R-package `mice` (van Buuren & Groothuis-Oudshoorn, 2011) for imputing ethnicity. We predicted ethnicity with a polynomial model that included the following information for each pupil: gender, number of received nominations as being clever/smart, number of received nominations as being physically attractive, number of received nominations as having good grades, number of received nominations as being considered a friend, class size (to control for limits in the maximal number of nominations that pupils can receive on each of the foregoing variables), and the self-reported share of Roma and Hungarian residents in the pupils' residential area (ranging from 'Only Roma/Gipsy families are living in the neighborhood' (coded 1) to 'only Hungarian families are living in the neighborhood' (coded 5)). Given that Roma in Hungary tend to have a significantly lower income and lower educational attainment than the Hungarian majority, we also included the self-reported average number of different types of appliance present in the household (e.g., color TV, washing machine, etc.), self-reported mean number of different types of objects in personal use (e.g., a desk, a room, etc.), and self-reported father's highest education (dummy coded, indicating with 0 up to grade 8 and with 1 higher than grade 8).

achievement in terms of good grades (i.e. has good grades vs. does not have good grades), because individuals might conceive this as indicating the possession of general abilities (cf. Hysom, 2009; Ridgeway, 1991; Webster & Hysom, 1998). Similar to ability attributions, perceptions of physical attractiveness and academic achievement were measured on network items on which pupils could nominate those class members whom they thought to possess these attributes. In the analyses, we labeled these dyad variables *dyad attractive* and *dyad good grades*.

We also controlled for friendship relations between pupils, because earlier research suggests that adolescents are more likely to attribute abilities to close friends than to less close individuals (Tesser, Campbell, & Smith, 1984; Tesser & Campbell, 1982). Friendship relations were measured with a 5-point network item converted into a dummy variable to indicate whether *i* considered *j* to be a friend (coded 1, comprising the original scale points 'like' and 'good friend') or not (coded 0, comprising the original scale points 'hate', 'dislike', and 'neutral'). In the analysis, we labeled this dyadic variable *dyad friend*.

5.3.3.4 Structural variables

We included the following structural variables in the model, which enabled us to control for social processes that might induce interdependence in ability attributions (see details in the appendix to this chapter). First, we controlled for the possibility that some class members might have a reputation for being especially intelligent, which might lead to an increase in the number of attributions they receive independently from their gender or ethnicity, with the structural variable *popularity*. Second, some class members might have a reputation for being not very intelligent, which might give them low status in the class, net of their status implied by gender or ethnicity. Low status individuals might generally tend to show respect more freely to other group members and attest to their abilities (Blau, 1964). We controlled for this possibility with the structural variable *activity*, which captures the possibility that some class members might be especially inclined to make a larger number of ability attributions to others. Third, displays of respect and admiration to others (e.g., by openly complementing the abilities of others) have the potential to lower one's rank in a given group, if they are not reciprocated. Individuals therefore tend to avoid such displays if they are not reciprocated (Gould, 2002; Lynn et al., 2009). If ability attributions are to some extent public, we might expect that concerns for reciprocity partly shape the likelihood that two class members will attribute abilities to each other. We controlled for this possibility with the structural variable *reciprocity*. Finally, we also included the structural variable *arc*, which captures the baseline probability of ability attributions to occur on a given class and operates like an intercept in logistic regression models.

Variable	Analysis 1 (C = 21)		Analysis 2 (C = 11)	
	M (SD)	Range	M (SD)	Range
ability attributions	.24 (.14)	.06-.52	.11 (.04)	.04-.16
attractive	.17 (.06)	.09-.28	.13 (.05)	.03-.19
good grades	.21 (.13)	.04-.42	.08 (.04)	.03-.14
friend	.21 (.05)	.15-.34	.20 (.03)	.16-.27

Table 5.1 Average share of nominations that were realized across the classes included in the two analyses. Analysis 1 focuses on gender and Analysis 2 focuses on ethnicity. C refers to the number of classes.

Variable	Total (N = 648)		Male (N = 238)		Female (N = 410)	
	M (SD)	Range	M (SD)	Range	M (SD)	Range
ability attributions	7.86 (6.35)	0-31	6.04 (5.48)	0-25	8.92 (6.59)	0-31
attractive	5.53 (5.91)	0-29	2.74 (3.47)	0-20	7.15 (6.41)	0-29
good grades	6.57 (6.49)	0-31	4.81 (5.79)	0-28	7.59 (6.66)	0-31
friend	6.46 (3.45)	0-21	6.07 (3.44)	0-18	6.69 (3.44)	0-21

Table 5.2 Average number of received nominations across pupils in Analysis 1: focus on gender. N refers to the number of respondents.

Variable	Total (N = 306)		Hungarian (N = 179)		Roma (N = 127)	
	M (SD)	Range	M (SD)	Range	M (SD)	Range
ability	3.00 (2.71)	0-13	3.87 (2.90)	0-13	1.78 (1.80)	0-9
attractive	3.64 (3.70)	0-18	3.31 (3.66)	0-18	4.10 (3.73)	0-16
good grades	2.18 (2.42)	0-16	2.78 (2.78)	0-16	1.32 (1.40)	0-6
friend	5.48 (2.52)	0-15	5.35 (2.50)	0-15	5.65 (2.54)	0-12

Table 5.3 Average number of received nominations across pupils in Analysis 2: focus on ethnicity. N refers to the number of respondents.

5.4 Results

5.4.1 Descriptive statistics

Table 5.1 shows the share of nominations that had been realized (calculated as #observed nominations/#possible nominations), averaged across classes. The results suggest that in the 21 classes included in the analysis that focused on gender (Analysis 1), the average share of realized nominations for ‘is clever/smart’ and ‘has good grades’ were about 2.5 times larger than in the 11 classes included in the analysis that focused on ethnicity (Analysis 2). Table 5.2 shows the average number of nominations that pupils received for the classes included in Analysis 1. Compared to male pupils, female pupils were on average nominated more often as clever/smart, attractive, having good grades, and as a friend. Table 5.3 shows the average number of nominations that pupils received for the classes included in Analysis 2. Compared to Hungarian pupils, Roma pupils were on average nominated less often as clever/smart and having good grades, but were nominated more often as attractive.

Status Characteristics Theory			
		Receiver	
		Male (0)	Female (1)
Sender	Male (0)	[1] 0 (both male = 0)	[2] -1 (receiver female = -1)
	Female (1)	[3] reference	[4] -1 (receiver female + both female = -1 + 0)

Social Identity Theory			
		Receiver	
		Male (0)	Female (1)
Sender	Male (0)	[1] 0 (both male = 0)	[2] -1 (receiver female = -1)
	Female (1)	[3] reference	[4] 0 (receiver female + both female = -1 + 1)

Table 5.4 Combinations of parameter estimates that would support the different theories, illustrated for gender. Male and female gender of the senders and receivers of ability attributions are coded in the margins of the sub-tables as 0 and 1 respectively. The different cells of the sub-tables (1 to 4) show the sum of the combined parameter estimates for the different variables in the model. The values of -1 and 1 in cells 1 to 4 represent decreases and increases in the likelihood that an ability attribution occurs from the sender to the receiver, contingent on the gender of the sender and the receiver. The value 0 means that this likelihood does not change.

5.4.2 Hypothesis testing

Our hypotheses imply specific combinations of parameter estimates for the receiver and similarity variables related to gender and ethnicity. To illustrate this, we use gender as an example and show the combination of the expected effects of the different variables in Table 5.4. The table can be applied to ethnicity by replacing the appropriate status categories (i.e. by replacing 'male' with 'Hungarian' and 'female' with 'Roma'). Status characteristics theory predicts that both male and female students will be less likely to attribute abilities to female students than to male students. This would be the case if the estimated effect of *receiver female* would be significantly lower than zero (e.g., -1), whereas the estimated effects of the gender-based similarity parameters (i.e. *both female* and *both male*) would not be significantly different from 0. Social identity theory, by contrast, holds that only males will be less likely to attribute abilities to females than to males. This would be the case if the parameter estimate of *receiver female* would be negative (e.g., -1, given that men are less likely to attribute abilities to them than to females) and the parameter estimate for *both female* would be positive (e.g., 1). The parameter estimate of *both male* would not be significantly different from 0.

Tables 5.5 and 5.6 show the parameter estimates of our ERG models focusing on gender (Analysis 1) and ethnicity (Analysis 2).[16] Concerning the structural variables, after controlling

[16] In most classes, the estimation algorithm converged in the allotted time frame, typically after about 20 to 25 repetitions. Only in the analysis that focused on gender did the algorithm fail to converge for one class, even after several fitting attempts. We therefore excluded this class from the analysis. Additionally, in four classes the

Variable/Characteristics	T_θ^2		$\hat{\mu}_\theta^{WLS}$	s.e. $(\hat{\mu}_\theta^{WLS})$		$\hat{\sigma}_\theta^2$	Q	
Structural variables								
arc	993.376	**	-1.905	0.150	**	0.338	94.822	**
reciprocity	52.040	**	0.227	0.095	*	0.083	39.005	**
activity	632.668	**	-4.894	0.511	**	3.361	91.751	**
popularity	76.237	**	-1.300	0.254	**	0.374	28.994	*
Dyad characteristics								
dyad attractive	280.772	**	0.790	0.095	**	0.118	49.656	**
dyad good grades	1498.880	**	1.803	0.081	**	0.074	44.846	**
dyad friend	243.204	**	0.702	0.107	**	0.165	60.942	**
Actor characteristics								
receiver Roma	25.498	**	-0.495	0.245		0.280	15.068	*
both Hungarian	9.573		0.195	0.219		0.215	8.147	
both Roma	24.155	**	0.220	0.546		1.410	18.400	**
receiver female	53.746	**	0.093	0.109		0.136	52.844	**
both male	40.837	**	0.128	0.130		0.181	37.269	**
both female	51.891	**	0.164	0.088		0.091	42.242	**

Table 5.5 Results of meta-analysis of ERG parameter estimates that predict ability attributions from Analysis 1: focus on gender. Each estimate is based on 20 classes, except for *activity* (16), *popularity* (16), *receiver Roma* (8), *similar Hungarian* (7), and *similar Roma* (6). Two-tailed significance levels: ** $p \leq .01$, * $p \leq .05$.

for all other variables in the models, attributions were more likely to not occur than they were to occur. They also tended to be equally distributed across pupils both in terms of attributions made and attributions received and tended to be reciprocal. This is indicated by the negative and significant parameter estimates (i.e. $\hat{\mu}_{\theta,p}^{WLS}$ and s.e. $(\hat{\mu}_{\theta,p}^{WLS})$) for *arc*, *activity*, and *popularity* and the positive estimate for *reciprocity*. Yet, the estimates of $\hat{\sigma}_{\theta,p}^2$ in combination with the Q_p statistic, which assess variation of parameter estimates across classes, indicate that the magnitude of these effects varied significantly across classes.

Concerning the dyad characteristics, in general a given pupil i was more likely to attribute abilities to another pupil j when i perceived j to be attractive, to have good grades, and to be a friend. This is indicated by the positive and significant estimates of the parameter estimates for *dyad attractive*, *dyad good grades*, and *dyad friend*. Again, the estimates of $\hat{\sigma}_{\theta,p}^2$ in combination with the Q_p statistic indicate that the magnitude of these effects varied significantly across

estimation of the parameters for *activity* and/or *popularity* created problems and sometimes led to unrealistically low estimates (well below -20 and even below -100). For these classes, we fixed the values of *activity* and/or *popularity* to -6 and -1 respectively, based on the estimates obtained from classes that were similar in terms of the share of realized ability attributions. We excluded these values from the meta-analysis. One class contained a sufficient number of both female/male and Roma/Hungarian pupils, but no ability attributions occurred among Roma pupils; the parameter of *similar Roma* could therefore not be estimated for this class and was removed from the analysis. In the analysis that focused on ethnicity, no reciprocal attributions occurred in one class and the number of pupils who nominated other pupils as attractive was very low. Both parameters could thus not be estimated in this class and were removed from the analysis.

Variable/Characteristics	T_θ^2		$\hat{\mu}_\theta^{WLS}$	s. e. $(\hat{\mu}_\theta^{WLS})$		$\hat{\sigma}_\theta^2$	Q	
Structural variables								
arc	296.060	**	-2.026	0.233	**	0.398	37.288	**
reciprocity	21.003	*	0.445	0.144	**	0.001	11.389	
activity	314.737	**	-3.542	0.497	**	2.219	51.153	**
popularity	28.413	**	-0.889	0.217	**	0.003	11.522	
Dyad characteristics								
dyad attractive	87.542	**	0.682	0.211	**	0.340	28.152	**
dyad good grades	327.231	**	1.769	0.094	**	-0.010	12.009	
dyad friend	90.860	**	0.709	0.188	**	0.288	35.690	**
Actor characteristics								
receiver female	13.504		0.070	0.166		0.074	13.249	
both male	8.392		0.019	0.263		0.212	8.052	
both female	18.533	**	0.311	0.171		0.105	13.670	*
receiver Roma	51.674	**	-0.886	0.255	**	0.411	23.912	**
both Hungarian	17.586		0.229	0.156		0.152	14.461	
both Roma	36.042	**	0.538	0.362		0.905	23.320	**

Table 5.6 Results of meta-analysis of ERG parameter estimates that predict ability attributions from Analysis 2: focus on ethnicity. Each estimate is based on 11 classes, except for *mutual* (10), *attractive* (10), *receiver female* (8), *similar male* (7), *similar female* (7), and *similar Roma* (10). Two-tailed significance levels: ** $p \leq .01$, * $p \leq .05$.

classes.

When it comes to the competing hypotheses, the results suggest that gender was not associated with ability attributions, given that neither the parameter estimates of *receiver female*, nor the estimates for *both male* and *both female* were significantly different from 0 in Analysis 1 (focus on gender) and Analysis 2 (focus on ethnicity). In the case of ethnicity, our results show that Roma pupils were less likely to receive ability attributions than Hungarian pupils in Analysis 2, regardless of whether the attributions were made by Hungarian or Roma pupils. We found a similar but not significant effect in Analysis 1. Thus, when it comes to gender, our results do not support either of the two theories. When it comes to ethnicity, our results support status characteristics theory in the analysis that focuses on ethnicity. Note that the parameter estimates of the different receiver and similarity variables also tended to vary significantly across classes.

5.5 Discussion and Conclusion

In this chapter, we contributed to the few field studies in status characteristics theory by (1) assessing ability attributions in enduring groups outside the laboratory that lack a strong collective task focus and by (2) testing competing mechanisms derived from status characteristics theory and social identity theory. Earlier work building on status characteristics theory has assumed that members of both status-advantaged categories and status-disadvantaged categories attribute higher abilities to members of status-advantaged categories. Social identity theory, by contrast, predicts that only members of status-advantaged categories

attribute higher abilities to members of their own category, whereas members of status-disadvantaged categories would not discriminate between the categories.

We assessed the competing predictions that the two theories yield for the status characteristics gender and ethnicity. In the case of ethnicity, our results are in line with the predictions of status characteristics theory. Roma pupils (defined as members of the status-disadvantaged category) were generally less likely than Hungarian pupils (defined as members of the status-advantaged category) and to receive ability attributions from both Hungarian and other Roma pupils. We found that this effect was significant in the analysis that explicitly focused on ethnicity, but not in the analysis that focused on gender and in which we had included information about ethnicity as control variables. The lack of significance in the latter analysis might be explained by the relatively lower number of classes in which we could control for effect of ethnicity, which undermines statistical power.

If we reject the notion that Roma pupils are systematically less intelligent than Hungarian pupils, these results suggest that the abilities that others attribute to them are affected by the status differences that exist between Hungarians and Roma in the larger Hungarian society. This effect seems to overrule possible effects of concerns for a positive self-image among Roma pupils. An alternative explanation might be that Roma pupils on average tend to perform less well at school than Hungarian students, possibly because they are aware of existing stereotypes and therefore experience cognitive strain that negatively affects their performance. Given that school performance is often assumed to reflect cognitive abilities, this difference might render the relation between ethnicity and ability attributions spurious. However, in our analysis, ethnicity affected ability attributions even after controlling for subjective evaluations of school performance among pupils.

In the case of gender, our results do not support the predictions of either theory. That is, although women are typically status-disadvantaged in the larger Hungarian society, female pupils were not less likely to receive ability attributions than male pupils, as status characteristics theory would predict. Female pupils were also not more likely than male pupils to attribute abilities to other female pupils, as social identity theory would predict. This lack of effect might be explained by changing contents of gender stereotypes. That is, given that today women tend to outperform men in terms of educational attainment in many OECD countries, including Hungary (Fényes, 2009; Legewie & DiPrete, 2012; OECD, 2012), status differences based on gender might be less related to assumptions about individual abilities and more related to assumptions about leadership skills (Ridgeway, 2011). If this is the case, we might have missed an important form of status differentiation that might exist among male and female pupils. Future research might therefore benefit from taking such alternative dimensions of status-related stereotypes into account.

One potential shortcoming of the status characteristics that we selected for our study is that they might differ in their salience during interactions. Gender is often easy to discern and salient in face-to-face interactions. Roma or Hungarian ethnicity, by contrast, might be less salient and might therefore be less likely to affect ability attributions. In the light of this possibility, our estimate of the effect that ethnicity has on ability attributions through status generalization might be lower than it would be if ethnicity was more salient. A second shortcoming is that the

data did not allow us to control for the strength with which participants identify with in-groups based on their gender or ethnicity. It seems possible that tendencies for in-group favoritism are stronger among individuals who identify more strongly with a given in-group. Relatedly, some participants indicated that they considered themselves both Hungarian and Roma at the same time. Such individuals are likely to be stigmatized by the Hungarian majority. However, among such individuals the identification with the Roma minority might be weaker than among pupils who only consider themselves Roma and this might reduce their tendency to favor Roma pupils in their ability attributions. Future research might therefore benefit from controlling for the strength of individuals' identification with a given social category.

Status characteristics theory holds that status generalization is most likely to occur when individuals have no information other than status characteristics to use for assessing each other's abilities. As we discussed earlier, there is reason to expect that ability stereotypes continue to affect ability attributions even during repeated interactions, in which individuals learn about each other's objective abilities and skills. However, such processes might weaken the average level of status generalization that we can observe in a given group. Similarly, over time individuals might discover more subliminal sources of similarity and dissimilarity that affect perceptions of in- and out-groups, which might reduce the effects of in-group favoritism based on more easily accessible characteristics such as gender and ethnicity. Future research could try to trace such possible 'decay' in the effects that gender and ethnicity have on ability attributions by collecting data at different time points throughout the school year, starting when the class is created. With our data, such longitudinal treatment is not possible, given that classes already existed a while when first wave data were collected, and because some measures used in this chapter only apply to the first wave of the study.

There was significant variation in some parameter estimates across classes, particularly among those related to gender and ethnicity. Future research could try to study the sources of such variation and thereby uncover contextual conditions that make status generalization and in-group favoritism more or less likely to occur. In some classes, for example, differences in gender and ethnicity might have been more salient than in other classes, possibly due to different treatment by teachers (e.g., teachers might try to create an inclusive atmosphere that makes other sources of similarity salient, or teachers might unconsciously favor male/female students) or differences in the communities that surround schools (e.g., communities in which inequality between the Hungarian majority and the Roma minority are openly discussed vs. communities in which this topic is not as salient). Gaining insight into the effects of such factors would enable us to determine better under what contextual conditions status generalization or in-group favoritism are more likely to occur.

Finally, we highlighted that earlier research has focused on ability attributions in groups with a collective task focus. Our results suggest that status generalization processes can affect ability attributions even in contexts without a collective task focus, at the expense of concerns for a positive self-image. This implies that the insights gained in earlier experimental research might be applicable to a range of contexts that is much wider than previously assumed.

5.6 Appendix to Chapter 5

The description of ERG models presented here is based on the volume edited by Lusher, Koskinen, and Robins (2013) and on Robins, Pattison, Kalish, and Lusher (2007), who provide extensive and detailed introductions to this class of models.

In an ERG framework, the members of a given class are represented as N nodes $i = \{1, \cdots, N\}$ and each ability attribution from one pupil i to another pupil j is treated as a random variable Y_{ij} (a tie variable) with the states $Y_{ij} = 1$ (i attributes abilities to j) and $Y_{ij} = 0$ (i does not attribute abilities to j); y_{ij}represents the observed value of Y_{ij}. These variables are collected in a stochastic adjacency matrix Y with N columns and N rows, in which the entry in the i'th row of the j'th column refers to the attribution from pupil i to pupil j. Self-attributions are not considered and the diagonal of this matrix can thus be neglected. y is a particular realization of this stochastic adjacency matrix (e.g., the observed network) and $\mathbf{Y}$ denotes the space of all possible adjacency matrices given a fixed N.

The goal of estimating an ERG model is to identify substructures in the overall network that provide support for some social mechanism of interest. When these structures occur more often than chance would imply, this suggests that the mechanism might have been involved in creating the observed network. Assume, for example, that the mechanism of interest is status generalization and that male (female) students belong to the status-advantaged (disadvantaged) category. If status generalization actually has affected the attributions in a given class, one would expect that male pupils receive on average more ability attributions than female pupils. In this case, the substructure of interest is attributions with male/female pupils as the target.

The frequency of a given substructure in a network is from here on referred to as a network statistic $g(y)$. Given a vector of such statistics, ERG models have the general form of

$$\Pr\left(Y = y|\hat{\theta}\right) = \left(\frac{1}{\kappa\left(\hat{\theta}\right)}\right) \exp\left(\sum_p \hat{\theta}_p g_p(y)\right), \tag{5.1}$$

where p indexes the vector of network statistics and $\hat{\theta}_p$ is the parameter estimate associated with the respective statistic; $\kappa\left(\hat{\theta}\right)$ is a normalizing constant, defined as

$$\kappa\left(\hat{\theta}\right) = \sum_{y \in \mathbf{Y}} \exp\left(\sum_p \hat{\theta}_p g_p(y)\right), \tag{5.2}$$

which ensures that the probabilities over all possible graphs with N actors sum up to 1. Note than in Eq. (5.1) the focus is on the entire network. This enables us to assess the importance of the different network statistics in the observed network. This importance is indicated by the value of $\hat{\theta}_p$, so that a large positive parameter estimate indicates that the number of observed instances of the substructure (e.g., the number of attributions with male pupils as the target) is higher than chance would imply, controlling for all other network statistics included in Eq. (5.1).

As mentioned in the main part of this chapter, three types of network statistics can be included in ERG models. Consider first the network statistics related to actor characteristics

Graph element	Name	Network statistic	Parameter in model
Actor characteristics			
	receiver effect	$\sum_{i,j} x_j y_{ij}$	receiver female, receiver Roma
	similarity effect	$\sum_{i,j} x_i x_j y_{ij}$	both female, both male, both Roma, both Hungarian
Dyadic characteristics			
	dyadic effect	$\sum_{i,j} w_{ij} y_{ij}$	dyad attractive, dyad good grades, dyad friend
Structural variables			
	arc	$\sum_{i,j} y_{ij}$	arc
	reciprocity	$\sum_{i,j} y_{ij} y_{ji}$	reciprocity
	activity	$e^{\alpha_{out}} \sum_{t=1}^{N-1} \{1-(1-e^{-\alpha_{out}})^t\} D_t^{out}(y)$	activity
	popularity	$e^{\alpha_{in}} \sum_{t=1}^{N-1} \{1-(1-e^{-\alpha_{in}})^t\} D_t^{in}(y)$	popularity

Table 5.7 Network statistics used in the analysis. Circles represent individuals; arrows with solid lines represent ability attributions; arrows with dashed lines represent relations/attributions of other traits (w). The color of the circles indicates individuals' states on a given status characteristic x. D_i^{out} and D_i^{in} refer to the number of attributions that i made (i.e. out-degree) and the number of attributions i received (i.e. in-degree); α_{out} and α_{in} are scaling parameters.

and the statistics related to dyad characteristics, as shown in Table 5.7. Statistics related to actor characteristics refer to ties that share nodes (i.e. pupils) with certain properties. *Receiver effect* assesses whether pupils with a certain state on a given characteristic (e.g., female gender) are more or less likely to receive ability attributions than pupils with another state on the characteristic. *Similarity effect* indicates whether an attribution from i to j is more or less likely when two pupils share the same state on a given characteristic (e.g., when both are female). Dyad characteristics assess whether other relational objects that exist among pupils might affect ability attributions. For example, in our analyses we assessed whether the fact that i perceives j as a friend makes it more likely that i attributes abilities to j.

We argue that ability attributions in enduring groups potentially violate the assumption of statistical independence. ERG models allow us to control for non-independence by the inclusion of statistics representing structural variables, that exclusively model how observed attributions relate to each other. Table 5.7 illustrates the structural variables that we considered in this study and shows the substructures that they model. *Reciprocity* refers to the number of reciprocated

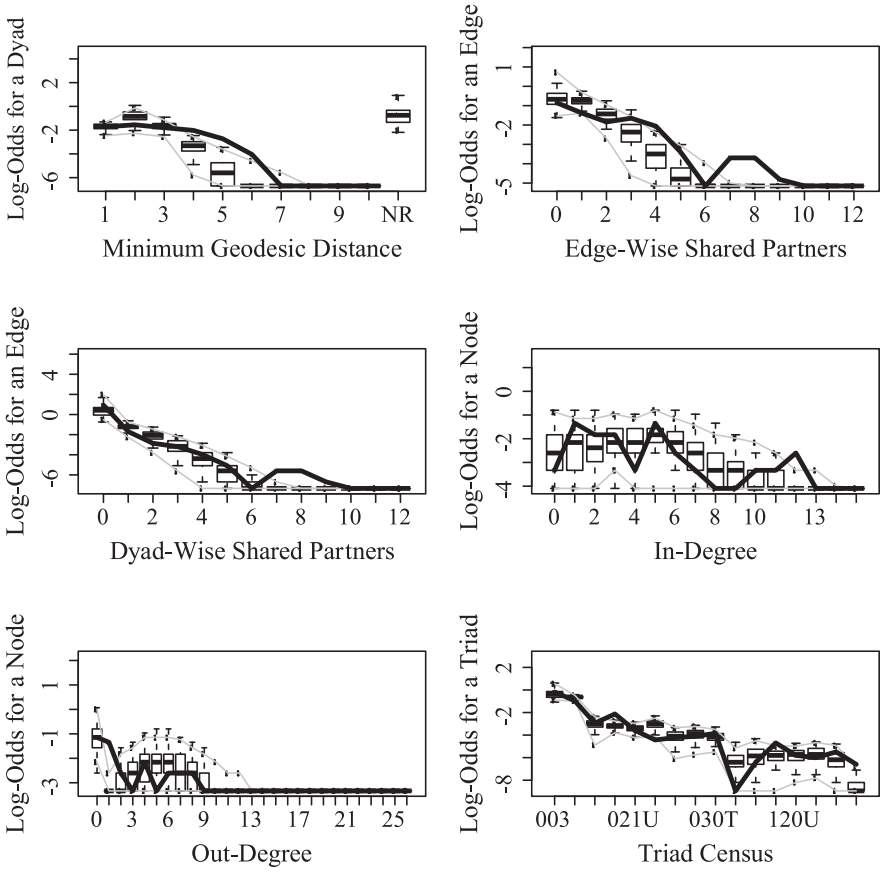

Figure 5.1 Example of goodness-of-fit assessment of ERG model in class 8. The bold black line represents observed statistics. The box plots represent the distribution of statistics obtained from simulated networks. The ticks on the x-axis of the panel that shows the triad census refer to the following triadic configurations from left to right: 003, 012, 102, 021D, 021U, 021C, 111D, 111U, 030T, 030C, 201, 120D, 120U, 120C, 210, 300.

attributions in a given class. A large positive parameter estimate for this statistic would mean that the observed attributions show a higher level of reciprocation than mere chance would imply. Similarly, *activity* and *popularity* are weighted counts of the number of attributions that class members made/received. A large positive parameter estimate for *activity* would mean a tendency for centralization in attributions so that some pupils seem more inclined to make attributions than others; a large positive parameter estimate for *popularity* would mean that some pupils receive more attributions than others, after controlling for all other covariates, which points to the possible effect of reputations. Negative estimates for these parameters imply that the distribution of attributions made and received tend to be similar across actors, controlling for all other variables in the model. *Arc* simply counts the number of attributions in the network and needs to be included as an intercept when estimating Eq. (5.1).

The estimation of ERG models relies on Markov chain Monte Carlo (MCMC) simulation

Distance	Obs.	Min.	Mean	Max.	MC p-value	Sig.
1	124	7	123.94	173	0.94	
2	142	1	248.05	423	0.14	
3	116	0	132.59	233	0.56	
4	95	0	29.02	64	0.00	**
5	50	0	4.91	25	0.00	**
6	14	0	0.80	16	0.02	*
7	1	0	0.18	7	0.08	
8	0	0	0.03	3	1.00	
9	0	0	0.01	1	1.00	
Inf	270	28	272.47	804	0.92	

Table 5.8 Goodness-of-fit assessment of ERG for class 8: model minimum geodesic distance. Two-tailed significance levels: ** $p \leq .01$, * $p \leq .05$.

Partners	Obs.	Min.	Mean	Max.	MC p-value	Sig.
0	37	6	41.01	56	0.62	
1	25	1	39.78	60	0.12	
2	17	0	24.65	48	0.58	
3	20	0	11.98	37	0.34	
4	14	0	4.53	14	0.06	
5	4	0	1.44	8	0.20	
6	0	0	0.43	4	1.00	
7	3	0	0.10	1	0.00	**
8	3	0	0.02	1	0.00	**
9	1	0	0.00	0	0.00	**

Table 5.9 Goodness-of-fit assessment of ERG for class 8: edge-wise shared partner. Two-tailed significance levels: ** $p \leq .01$, * $p \leq .05$.

methods, in which ties are randomly added or removed from a simulated graph with N actors. The goal of this simulation process is to find a parameter combination that is most likely to generate a network that is similar to the observed network. This approach thus provides maximum likelihood estimates of parameter values. In our analyses, we conducted the MCMC simulations with the R-package `statnet` (Handcock, Hunter, Butts, Goodreau, & Morris, 2008). We selected a burn-in of 100,000 and a sample size of 10,000 with an interval of 5,000; we repeated the MCMC algorithm up to 50 runs, each time using the parameter estimates obtained from the previous run as starting values, or until the estimation process had converged. In `statnet`, the structural variables *activity* and *popularity* are implemented as geometrically weighted out-degree (GWO) and geometrically weighted in-degree (GWI), which are subject to the weighting parameters α_{out} and α_{in} (see Table 5.7). Based on systematic exploration of different parameterizations, we selected the values $\alpha_{out} = .095$ and $\alpha_{in} = .693$.

Hunter, Goodreau, and Handcock (2008) proposed to assess the goodness-of-fit of an ERG model by simulating a large number of networks based on the estimated parameters and

Partners	Obs.	Min.	Mean	Max.	MC p-value	Sig.
0	583	262	481.02	810	0.32	
1	126	2	184.35	283	0.14	
2	44	0	91.10	181	0.26	
3	32	0	38.37	87	0.96	
4	15	0	12.43	44	0.74	
5	5	0	3.62	18	0.60	
6	0	0	0.87	7	1.00	
7	3	0	0.19	2	0.00	**
8	3	0	0.03	1	0.00	**
9	1	0	0.02	1	0.04	*

Table 5.10 Goodness-of-fit assessment of ERG for class 8: dyad-wise shared partner. Two-tailed significance levels: ** $p \leq .01$, * $p \leq .05$.

In-degree	Obs.	Min.	Mean	Max.	MC p-value	Sig.
0	1	0	3.05	24	0.64	
1	6	0	2.70	9	0.18	
2	4	0	2.91	9	0.72	
3	4	0	3.59	8	0.96	
4	1	0	3.55	8	0.30	
5	6	0	3.82	10	0.34	
6	2	0	3.33	9	0.74	
7	1	0	2.25	8	0.76	
8	0	0	1.43	6	0.52	
9	0	0	0.93	4	0.84	
10	1	0	0.65	3	0.90	
11	1	0	0.44	2	0.72	
12	2	0	0.18	2	0.02	*
13	0	0	0.11	1	1.00	
14	0	0	0.03	1	1.00	
15	0	0	0.02	1	1.00	
16	0	0	0.01	1	1.00	

Table 5.11 Goodness-of-fit assessment of ERG for class 8: in-degree. Two-tailed significance levels: ** $p \leq .01$, * $p \leq .05$.

comparing the average network statistics that these networks provide against the observed statistics. We employed this approach here and simulated for each class in which the MCMC algorithm had converged 100 networks based on the estimated parameters. For these networks, we compared the distribution of the following statistics against the observed data:

(1) Minimum geodesic distance = the distribution of the minimal number of directed attribution steps that (indirectly) connect each dyad of pupils in the class.

(2) Edge-wise shared partners = the distribution of the number of instances in which a pupil i attributed abilities to j and k, while j attributed abilities to k.

Out-degree	Obs.	Min.	Mean	Max.	MC p-value	Sig.
0	7	1	7.44	26	1.00	
1	6	0	0.73	2	0.00	**
2	2	0	1.31	5	0.70	
3	1	0	2.26	6	0.64	
4	3	0	2.86	8	1.00	
5	1	0	3.27	9	0.34	
6	2	0	3.23	9	0.70	
7	2	0	2.58	7	1.00	
8	2	0	2.40	6	1.00	
9	1	0	1.41	5	1.00	
10	0	0	0.71	4	1.00	
11	0	0	0.34	4	1.00	
12	0	0	0.28	2	1.00	
13	0	0	0.09	1	1.00	
14	0	0	0.05	1	1.00	
15	0	0	0.02	1	1.00	
16	0	0	0.02	1	1.00	
20	1	0	0.00	0	0.00	**
23	1	0	0.00	0	0.00	**

Table 5.12 Goodness-of-fit assessment of ERG for class 8: out-degree. Two-tailed significance levels: ** $p \leq .01$, * $p \leq .05$.

Triad type	Obs.	Min.	Mean	Max.	MC p-value	Sig.
003	1659	928	1528.06	3474	0.60	
012	1014	172	1246.54	1452	0.08	
102	183	0	175.47	324	0.88	
021D	389	4	143.32	234	0.00	**
021U	98	2	117.73	198	0.58	
021C	43	1	174.54	333	0.04	*
111D	53	0	63.59	125	0.88	
111U	59	0	77.01	153	0.52	
030T	77	1	58.07	132	0.48	
030C	0	0	7.78	35	0.08	
201	6	0	12.99	48	0.64	
120D	33	0	11.75	29	0.00	**
120U	11	0	12.64	32	0.92	
120C	9	0	14.50	36	0.60	
210	15	0	9.21	30	0.46	
300	5	0	0.80	9	0.04	*

Table 5.13 Goodness-of-fit assessment of ERG for class 8: triad census. Two-tailed significance levels: ** $p \leq .01$, * $p \leq .05$.

(3) Dyad-wise shared partners = the distribution of the number of instances in which a

pupil *i* attributed abilities to *j* and *k*, while *j* did not attribute abilities to *k*.

(4) In-degree = the distribution of the number of attributions received across class members.

(5) Out-degree = the distribution of the number of attributions made across class members.

(6) Triad census = the distributions of 16 different triadic configurations (i.e. patterns of attributions among three pupils); see Davis and Leinhardt (1972) for a detailed discussion of these configurations.

Figure 5.1 visually illustrates such a goodness-of-fit assessment for one class (without variables related to ethnicity) in the sample and Tables 5.8 to 5.13 show formal tests of the fit between the respective network statistic in the simulated networks and the observed network. A significant deviation means here that a given graph property is observed less or more often in the simulated networks that in the observed network. As Robins and Lusher (2013, p. 185) highlighted, an ERG model should not be expected to "fit all features of a network, just as we do not expect a regression to explain 100% of the variance", and this is particularly the case if we want to fit the same model to several networks that all have their own idiosyncrasies. Yet, a model should fit the network aspects of interest reasonably well. To illustrate this, consider in-degree and out-degree distributions, which our model addressed with the GWI and GWO parameters. Figure 5.1 and tables 5.11 and 5.12 suggest that the model captures the observed distributions well, although the simulated distribution occasionally deviates significantly from single observed statistics. For example, the model captures the in-degree distribution generally well, but it significantly underestimates the number of cases with in-degree 12 in class 8. If we would focus on only one network, we might try to adjust the model to account for this. However, if there are multiple networks, this might come at the loss of generalizability if this means that different models need to be estimated for different classes. Turning next to network statistics that were not in the focus of the analysis, the model does a good job in capturing, for example, the distribution of different triads, although the model did not include parameters that focused on triads. Together, these results suggest that the model generates networks that capture the trends across classes well, even though the model cannot capture all idiosyncrasies of all classes.

Finally, Snijders and Baerveldt (2003) suggested that the parameters obtained from applying social network models to different school classes can be treated as different case studies, which can be analyzed with standard meta-analytic procedures. In line with this, we calculated the following measures (see Snijders & Baerveldt 2003 for details; note that *C* refers to the number of classes in the sample):

(1) $T^2_{\theta,p}$ enables us to assess whether all estimates for a given parameter are 0 in the population of classes. The statistic follows a chi-squared distribution with *C* degrees of freedom.

(2) $\hat{\mu}^{WLS}_{\theta,p}$ and $\mathrm{s.e.}\left(\hat{\mu}^{WLS}_{\theta,p}\right)$ enable us to assess whether a given variable has a significant effect on ability attributions across the sample of classes. These statistics refer to the weighted least square estimates of the average parameter estimates ($\hat{\mu}^{WLS}_{\theta,p}$) and their standard errors in the population of classes ($\mathrm{s.e.}\left(\hat{\mu}^{WLS}_{\theta,p}\right)$). They can be used to

calculate a t-ratio that approximately follows a standard normal distribution that can be used to assess the statistical significance of a parameter estimate across classes.

(3) $\hat{\sigma}^2_{\theta,p}$ enables us to assess whether in the estimate of a given parameter varies across classes. The associated Q_p statistic, which has a chi-squared distribution with $C-1$ degrees of freedom, makes it possible assess the significance of $\hat{\sigma}^2_{\theta,p}$.

Chapter 6

General Discussion and Conclusion

6.1 Introduction

Status differentiation is a phenomenon that can affect both individuals and social groups and that can be observed in virtually all human collectives, no matter how small or large. Given this ubiquity, much sociological research has examined the conditions under which differences emerge in the social worth and competence that individuals and social groups are attributed. Despite this plethora of research, there remain significant gaps in our knowledge as to how status differentiation comes about. In this dissertation, I aimed to narrow some of these gaps. In four studies, separated in two parts, I studied some processes involved in the emergence of status differentiation between social groups (Chapters 2 and 3) and in the emergence of status differentiation between individuals (Chapters 4 and 5).

In Part 1, I argued that earlier theoretical research on the emergence of status differentiation between social groups has neglected some of the complexities involved in the emergence of status differentiation. Earlier research suggests that during face-to-face interactions in small groups with a collective task focus, status differentiation can emerge spontaneously between individual members. If this differentiation accidentally coincides with differences in a salient social distinction (e.g., gender, race, or ethnicity) individuals can come to believe that differences in the distinction signify differences in social worth and competence. Once such a status belief has emerged, it can spread throughout society, because belief-holders treat new interaction partners in line with it and thereby teach it to others (Mark et al., 2009; Ridgeway, 1991). The emergence and diffusion processes described by earlier research involve decentralized interactions between large numbers of individuals that occur simultaneously in different parts of society. To make these processes analytically tractable, earlier research made several simplifying assumptions about the way interactions occur in both small groups and large populations. I argued that by relaxing some of these simplifying assumptions, we could gain important new insights into the conditions under which status differentiation between social groups emerges.

In Part 2, I argued that earlier empirical research on the emergence of status differentiation between individuals is limited by its reliance on laboratory studies that centered on groups with a collective task focus. The choice of laboratory settings and the emphasis on groups with a collective task focus undoubtedly have important advantages. First, the use of laboratory settings makes it possible to study the processes involved in the emergence of status differentiation, while controlling for other factors that might intervene in these processes. Second, the concentration on groups with a collective task focus has made it possible to develop a set of analytically sharp assumptions and propositions that are highly consistent within a task focused context. However, I argued that reliance on ad hoc created laboratory groups with a collective task focus has limited the generalizability of the insights that earlier research has

generated. Put differently, to date we know little about how status differentiation between individuals comes about in groups that exist outside the laboratory and do not have a collective task focus.

In this concluding chapter, I first summarize how I addressed the foregoing shortcomings in the two parts of this book and discuss the main findings. Subsequently, I discuss the implications of these findings and provide an outlook for future research.

6.2 Summary of Main Findings

6.2.1 Part I: The complexity of status construction processes

In Chapter 2, I studied the conditions under which beliefs about the relative social worth and competence of members of different social categories emerge from interactions in groups with a collective task focus (Research Question 1). To this end, I developed an agent-based computational model that implemented behavioral and cognitive processes involved in the emergence of status differentiation, as described in the expectation states framework and status construction theory. The development of this model was induced by earlier modeling work presented by Mark et al. (2009). In this earlier work, the authors showed theoretically that task focused interactions in small groups might lead to the spontaneous emergence and diffusion of status beliefs in larger populations. I argued that one shortcoming of this earlier work was that it had focused on interactions in dyads as the smallest possible group in which status differentiation between members of different social categories can emerge. Consequently, we have little knowledge about how the behavioral and cognitive process that the expectation states framework and status construction theory describe affect the emergence of status differentiation between members of different social categories in groups larger than dyads.

Systematic computational experimentation with the new agent-based model suggested that the cognitive and behavioral processes that the expectation states framework and status construction theory describe have a strong tendency to generate status beliefs, also in groups larger than dyads. However, this tendency becomes weaker as group size increases, and is stronger when groups interact for a very short or very long amount of time. Additionally, I explored the possibility that status beliefs might affect the interactions in the context in which they had emerged (i.e. in the groups in which they were acquired). I found that if this would be the case, status beliefs would be much more likely to remain stable once they have emerged.

In Chapter 3, I examined whether spatial clustering in the network of task focused interactions in larger populations might affect the emergence and diffusion of status beliefs. Specifically, I examined whether spatial network clustering facilitates the emergence of regional variation in the status values that salient social distinctions have (Research Question 2). Earlier modeling work by Ridgeway and Balkwell (1997) and Mark et al. (2009) suggests that the cognitive and behavioral processes that the expectation states framework and status construction theory describe might have a strong tendency to generate status beliefs that might become widely consensual in any population. I argued that this implication of the theoretical assumptions that earlier research has used might be due to the simplifying assumption that task focused interactions occur at random between any two members of the larger population. I

suggested that once we take into account that task focused interaction tends to be clustered spatially, the diffusion processes might not be so strong anymore, and instead might lead to regional variation in status beliefs. To assess the logical consistency of this argument, I developed an agent-based computational model that was largely based on the formal model presented by Mark et al. (2009).

Computational experimentation with the new model suggested that if interaction networks are spatially clustered, the behavioral and cognitive processes that the expectation states framework and status construction theory describe still have a strong tendency to spontaneously create status beliefs. However, in line with my expectations, these beliefs were likely to show a high level of regional variation. Unexpectedly, this outcome crucially depended on a cognitive assumption of status construction theory that earlier modeling work has largely neglected. Specifically, regional variation in status values in the presence of spatial network clustering is only likely to occur when individuals do not require their experiences on which a given status belief is based to be very consistent. That is, regional variation in status values is likely to occur when individuals adopt a status belief as soon as a slight majority of their past interactional experiences supports this belief. By contrast, when almost all of their past interactions are needed to support a given belief, regional variation in status values is unlikely to occur. This is because if individuals acquire a status belief only when there is very consistent support for it, it becomes very unlikely that they acquire any status beliefs *at all*. This also undermines the formation of regional variation in status values.

6.2.2 Part II: The laboratory and scope conditions

In Chapter 4, I examined the conditions under which members of task focused groups outside the laboratory are willing to respect high performing group members (Research Question 3). Specifically, I examined how the level of task interdependence and informal interdependence that the members of organizational teams experience affect the extent to which they make their respect for their colleagues contingent on the performance of these colleagues. Earlier management research has implicitly assumed that the members of organizational teams will always be willing to ‘reward’ performance with respect. I highlighted that this willingness might crucially depend on the level of task interdependence that individual team members experience. The reason is that conferring respect to others is a potentially costly act, given that it might lower the status of the conferring individual in the team. Consequently, team members might only be willing to confer respect for performance if they expect that this might indirectly benefit themselves. This, I argued, is only the case when the level of task interdependence that team members experience is high. Additionally, I highlighted that individuals value the friendship and social support of their immediate colleagues, whereas status differentiation can undermine both friendship and support. I argued that making the respect for others contingent on their performance might thus have an additional cost attached, at least when individuals are well integrated into their respective team. This cost, in turn, might make them reluctant to make their regard for others contingent on performance. Evidently, in the short-lived and artificial context of the laboratory, such motivations might not matter. However, in the context of enduring groups outside the laboratory such motives might be crucial for the status allocation

process.

The empirical assessment of the foregoing hypotheses supported the prediction that the level of task interdependence that individual team members experience affects their willingness to reward performance with respect. That is, the results suggested that the members of the organizational teams that I examined were more likely to reward the performance of their colleagues with respect when they perceived that the successful completion of their own tasks depended on the performance of others. By contrast, the level of informal interdependence that respondents experienced only increased the general level of respect they had for their direct colleagues, but it did not moderate the relation between performance and respect.

In Chapter 5, finally, I studied the way in which status characteristics affect the ability and competence attributions in enduring groups that do not have a collective task focus (Research Question 4). Earlier experimental research suggests that status characteristics might affect such attributions either through a process of status generalization or through a process of constrained in-group favoritism. I argued that this latter process might be particularly strong in groups that do not have a collective task focus (such as school classes). The reason is that the lack of strong functional pressures to evaluate the abilities of others accurately might increase individuals' inclination to engage in behaviors that aim at improving their self-image (i.e. engaging in in-group favoritism).

I assessed both processes for the status characteristics gender and ethnicity, in the context of Hungarian school classes. In the larger Hungarian society, both gender and ethnicity are assumed to be status characteristics, each creating two groups of individuals of which one is status-advantaged (men and Hungarians) and one is status-disadvantaged (women and Roma). Unexpectedly, in the case of gender, the results did not support the notion that belonging to either of the two categories affects the abilities and competence that others attribute to individuals. In the case of ethnicity, by contrast, the results suggested that this characteristic affects ability attributions through a process of status generalization.

6.3 Discussion and Outlook for Future Research

The studies presented in this dissertation have several important implications for research on the emergence of status differentiation between individuals and social groups and point to a number of promising new research directions. From a theoretical point of view, the findings presented in Chapters 2 and 3 together suggest that status construction processes might be a powerful force in the *creation* of status differentiation between social groups in *local contexts*, but they might not be as powerful in *diffusing* such status differentiation throughout the *population*, depending on the social structural context conditions in which they occur. The first insight is in line with existing empirical and theoretical work on status construction processes. That is, earlier work suggests that in small group contexts, face-to-face interactions between members of different social categories might easily create the belief that members of one category are more respectable and more competent than members of another category. My simulation experiments suggest that this might even hold in groups considerably larger than the groups that were the focus of earlier research. The second insight gained from the work presented here, by contrast, diverges from the results of earlier modeling work, which suggests

that status beliefs can spread easily once they have emerged. However, I considered the larger social structure in which task focused interactions occur in the form of the spatial clustering of interaction networks. This dissertation therefore points to new boundary conditions under which processes of status differentiation between individuals can lead to status differentiation between social groups in the population.

The research that underlies the foregoing insights is purely theoretical and future research might generate intriguing new insights when putting the predictions generated here to the empirical test. A first step in this direction would be to amend current experimental designs so that the emergence of status beliefs from face-to-face interactions can be examined in groups that exist in parallel to each other and whose members occasionally interact across group boundaries. This adjustment would be an important first step toward studying the emergence and diffusion of status beliefs in 'locally clustered' interactions under controlled conditions. Outside the laboratory, existing survey data could be used to test some of the predictions presented here. For example, Brashears (2008) used data from the International Social Survey to assess how country level variation in the possession of resources and power can be related to variation in status differences between social groups (i.e. between men and women). By moving from a focus on *between country variation* to a focus on *within country variation*, this earlier research could be extended to assess how much of the existing within country variation in the status differences between men and women might be due to national-level variation in spatial network clustering. The level of spatial network clustering that exists in a given country could be approximated, for example, from information about the level of urban agglomeration and the infrastructure that connects larger cities.

From an empirical point of view, the results presented in Chapters 4 and 5 suggest that some of the principles that lead to the emergence of status differentiation between individuals are less universal than has previously been assumed, whereas others are more general. Specifically, the results presented in Chapter 4 suggest that earlier management research might have been too optimistic about individuals' willingness to reward performance with respect in task focused settings and that future field research might benefit from paying special attention to the conditions under which a given team operates. For practitioners, the results imply that they might be able to alleviate problems that can arise from status competition based on political behavior by highlighting the task interdependence that exists within a team. Such an increased emphasis on interdependence might make individuals more willing to engage in costly acts of status conferral to the benefit of the team, rather than withholding status from others.

The results presented here suggest that status generalization is a powerful process that affects individuals even in contexts where previous research often did not expect it. Earlier research has revealed that status characteristics would affect the abilities and competence that individuals attribute to others when there are strong functional pressures (i.e. a collective task focus), but my results suggest that it occurs even in the absence of functional pressures. This suggests that status differentiation between social groups translates back to the individual level in more contexts than previously thought. This insight lends further urgency to the recent appeal by Ridgeway that "to understand the mechanisms by which inequality is actually made in

society […] we need to more thoroughly incorporate the effects of status […] alongside those based on resources and power" (Ridgeway, 2014, p. 12).

Samenvatting – Dutch Summary

Sociale status beschrijft de sociale waarde en competenties die individuen en sociale groepen wordt toegeschreven door anderen. In de meeste samenlevingen en sociale collectieven zijn er statusverschillen: sommige individuen en sociale groepen wordt meer status toegeschreven dan anderen. Deze ongelijke verdeling in de toekenning van sociale waarde en competenties wordt ook omschreven als "statusdifferentiatie". Ondanks een overvloed aan onderzoek naar statusdifferentiatie bestaan er nog steeds lacunes in onze kennis over haar oorzaken. Het doel van dit proefschrift is om een aantal van deze lacunes te verkleinen. In vier studies, opgedeeld in twee verschillende delen, bestudeer ik een aantal van de processen die status differentiatie tussen sociale groepen en individuen beïnvloeden.

De onderzoeksvragen in deel 1 (hoofdstukken 2 en 3) hebben een *theoretische focus* en hebben betrekking op de dynamiek die kan leiden tot het ontstaan van status differentiatie tussen sociale groepen in kleine en grote collectieven (dwz in kleine groepen en in de grotere populatie). Voor het bestuderen van deze processen heb ik gebruik gemaakt van *agent-based computational modeling*. De onderzoeksvragen in deel 2 (hoofdstukken 4 en 5) hebben een *empirische focus* en richten zich op de voorwaarden waaronder bepaalde status gerelateerde cognitieve en gedragsmatige processen plaatsvinden buiten het laboratorium. Voor het bestuderen van deze processen heb ik gebruik gemaakt van sociale netwerkanalyse.

De data voor de empirische analyses in deel 2 komen uit twee bronnen. De eerste bron is een longitudinale studie die ik samen met mijn collega's heb uitgevoerd op een middelgrote Nederlandse kinderopvang. De medewerkers van de vier afdelingen die hebben meegedaan aan dit onderzoek verzorgen kinderen met speciale sociale en psychologische behoeften. De tweede bron bestaat uit data die werden verzameld in het kader van het project *Wired into Each Other: Network Dynamics of Adolescents in the Light of Status Competition, School Performance, Exclusion, and Integration* uitgevoerd door het *Research Center for Educational and Network Studies* (RECENS). Deze data bestaan uit informatie van leerlingen van 43 klassen (in rang 9) uit zeven openbare scholen verspreid over Hongarije.

In hoofdstuk 2 onderzoek ik hoe status differentiatie tussen sociale groepen, zoals mannen/vrouwen, kunnen voorkomen uit taakgerichte interacties in kleine groepen. Recente theoretisch onderzoek in *status construction theory* suggereert dat interacties in dergelijke groepen opvattingen over de sociale waarde en competenties van de leden van verschillende sociale categorieën (dwz *status beliefs*) kunnen beïnvloeden. Dit werk concentreerde zich op dyaden als de kleinst mogelijke groepen waarin zulke opvattingen kunnen ontstaan. Echter, veel taakgerichte interacties vinden plaats in groepen groter dan dyaden. Daarom heb ik een agent-based computational model ontwikkeld dat het mogelijk maakt de ontwikkeling van status beliefs te onderzoeken in groepen groter dan dyades. Simulatie experimenten met het nieuwe model suggereren dat gedragsprincipes waarvan bekend is dat ze spontane status differentiatie tussen individuele leden van een groep creëren ook de neiging hebben om deze differentiatie met categorische verschillen te associëren en daarmee de ontwikkeling van status beliefs bevorderen. Deze neiging is sterker in kleinere groepen en groepen die voor een zeer

korte of lange tijd bestaan.

In hoofdstuk 3 bestudeer ik waarom de statuswaarde van sociale kenmerken zoals geslacht, leeftijd en etniciteit verschilt per geografische regio's. Eerder onderzoek stelt dat regionale verschillen in culturele en institutionele factoren, zoals religie en de economische organisatievorm, tot verschillen in macht en middelen tussen de leden van verschillende sociale categorieën kunnen leiden. Verschillen in macht en middelen kunnen resulteren in statusverschillen. In dit hoofdstuk beschrijf ik een nieuw mechanisme dat regionale verschillen in de statuswaarde van sociale kenmerken kan genereren, zonder daarbij te veronderstellen dat de statusverschillen veroorzaakt worden door culturele en institutionele factoren. De nieuwe verklaring verbindt mechanismen op het micro-niveau, zoals beschreven in status construction theory, met structurele voorwaarden op het macro-niveau, gebaseerd op onderzoek naar sociale netwerken. Volgens de status construction theory kunnen interacties tussen leden van verschillende sociale groepen opvattingen over de status van de verschillen groepen creëren. Onderzoek naar sociale netwerken suggereert dat dergelijke interacties vaak ruimtelijk geclusterd zijn en dat zij vaker binnen dan tussen geografische regio's gebeuren. Ik stel dat de wisselwerking tussen ruimtelijke netwerk clustering en status construction processes kan leiden tot regionale variatie in statuswaarden. De resultaten van een door mij ontwikkeld agent-based model suggereren dat ruimtelijke netwerk clustering inderdaad kan leiden tot regionale verschillen in statuswaarden, in overeenstemming met de door de status construction theory voorspelde cognitieve en gedragsprocessen.

In hoofdstuk 4 onderzoek ik de voorwaarden waaronder de leden van teams in organisaties bereid zijn om waardering te uiten voor hoge prestaties van andere teamleden. Functionalistische verklaringen van status differentiatie stellen dat status differentiatie in teams als een informeel beloningssysteem werkt. Hierbij belonen teamleden de prestaties van anderen met respect, om op deze manier de doelen van het team te bereiken. Eerder onderzoek veronderstelde dat de relatie tussen status en prestaties in teams universeel is. In dit hoofdstuk stel ik dat de *status-performance* link niet zo universeel is en afhankelijk is van de mate waarin teamleden *task interdependence* en *informal interdependence* (dus interdependentie in hun tak gericht en sociale relaties met andere team leden) ervaren. Ik stel dat individuen de prestaties van hun collega's meer met respect belonen als ze meer task interdependence ervaren, maar minder als ze meer informal interdependence ervaren. De resultaten suggereren dat in de onderzochte teams task interdependence de relatie tussen respect en prestaties inderdaad beïnvloedt. Informal interdependence verhoogt in het algemeen het respect dat teamleden voor anderen hebben, maar het heeft daarentegen geen invloed op de relatie tussen prestatie en respect.

In hoofdstuk 5 onderzoek ik hoe geslacht en etniciteit opvattingen over andermans competentie en bekwaamheid beïnvloeden. Eerder experimenteel onderzoek in *status characteristics theory* suggereert dat geslacht en etniciteit *status characteristics* zijn die tot *status generalization* leiden. In dit proces projecteren mensen hun status opvattingen op andere individuen, gebaseerd op hun lidmaatschap in categorieën zoals geslacht. Eerder onderzoek heeft status generalization voornamelijk onderzocht in het laboratorium, met groepen die sterk gericht waren op een collectieve taak. In dit hoofdstuk stel ik dat *in-group favoritism* een

alternatief mechanisme is dat status generalization processen buiten het laboratorium kan ondermijnen. De resultaten suggereren dat in de onderzochte steekproef van de Hongaarse schoolklassen, geslacht in het algemeen geen invloed op opvattingen over andermans competentie en bekwaamheid heeft. Etniciteit heeft wel een invloed, en dit door middel van status generalization, maar niet door middel van in-group favoritism.

References

Agneessens, F., & Wittek, R. P. M. (2012). Where do Intra-Organizational Advice Relations Come From? The Role of Informal Status and Social Capital in Social Exchange. *Social Networks*, *34*(3), 333–345.

Anderson, C., Hildreth, J. A. D., & Howland, L. (2015). Is the Desire for Status a Fundamental Human Motive? A Review of the Empirical Literature. *Psychological Bulletin*, *141*(3), 574–601.

Anderson, C., & Kennedy, J. A. (2012). Micropolitics: A New Model of Status Hierarchies in Teams. In M. A. Neale & E. A. Mannix (Eds.), *Research on Managing Groups and Teams* (Vol. 15, pp. 49–80).

Anderson, C., & Kilduff, G. J. (2009). The Pursuit of Status in Social Groups. *Current Directions in Psychological Science*, *18*(5), 295–298.

Anderson, C., Kraus, M. W., Galinsky, A. D., & Keltner, D. (2012). The Local-Ladder Effect: Social Status and Subjective Well-Being. *Psychological Science*, *23*(7), 764–771.

Back, M. D., & Kenny, D. A. (2010). The Social Relations Model: How to Understand Dyadic Processes. *Social and Personality Psychology Compass*, *4*(10), 855–870.

Bales, R. F. (1950). *Interaction Process Analysis: A Method for the Study of Small Groups*. Oxford: Addison-Wesley.

Bales, R. F. (1970). *Personality and Interpersonal Behavior*. New York: Holt, Rinehart and Winston.

Bales, R. F., Strodtbeck, F. L., Mills, T. M., & Roseborough, M. E. (1951). Channels of Communication in Small Groups. *American Sociological Review*, *16*(4), 461–468.

Balkwell, C., & Balswick, J. (1981). Subsistence Economy, Family Structure, and the Status of the Elderly. *Journal of Marriage and Family*, *43*(2), 423–429.

Balkwell, J. W. (1991a). From Expectations to Behavior: An Improved Postulate for Expectation States Theory. *American Sociological Review*, *56*(3), 355–369.

Balkwell, J. W. (1991b). Status Characteristics and Social Interaction: Assessment of Theoretical Variants. In E. J. Lawler, B. Markovsky, C. L. Ridgeway, & L. Walker (Eds.), *Advances in Group Processes* (Vol. 8, pp. 135–176).

Balkwell, J. W., & Berger, J. (1996). Gender, Status, and Behavior in Task Situations. *Social Psychology Quarterly*, *59*(3), 273–283.

Balland, P.-A. (2012). Proximity and the Evolution of Collaboration Networks: Evidence from Research and Development Projects within the Global Navigation Satellite System (GNSS) Industry. *Regional Studies*, *46*(6), 741–756.

Barker, J. R. (1993). Tightening the Iron Cage: Concertive Control in Self-Managing Teams. *Administrative Science Quarterly*, *38*(3), 408–437.

Barrick, M. R., & Mount, M. K. (1993). Autonomy as a Moderator of the Relationships Between the Big Five Personality Dimensions and Job-Performance. *Journal of Applied Psychology*, *78*(1), 111–118.

Bates, D., Maechler, M., Bolker, B., & Walker, S. (2015). lme4: Linear Mixed-Effects Models

using Eigen and S4. *R Package Version 1.1-8*.

Bendersky, C., & Hays, N. A. (2012). Status Conflicts in Groups. *Organization Science*, *23*(2), 323–340.

Berger, J., Cohen, B. P., & Morris, Z. (1972). Status Characteristics and Social Interaction. *American Sociological Review*, *37*(3), 241–255.

Berger, J., Fisek, M. H., Norman, R. Z., & Zelditch, M. (1977). *Status Characteristics and Social Interaction: An Expectation-States Approach*. New York: Elsevier.

Berger, J., Rosenholtz, S. J., & Zelditch, M. (1980). Status Organizing Processes. *Annual Review of Sociology*, *6*, 479–508.

Bettencourt, B. A., Charlton, K., Dorr, N., & Hume, D. L. (2001). Status Differences and In-Group Bias: A Meta-Analytic Examination of the Effects of Status Stability, Status Legitimacy, and Group Permeability. *Psychological Bulletin*, *127*(4), 520–542.

Bianchi, A. J., & Lancianese, D. A. (2007). Accentuate the Positive: Positive Sentiments and Status in Task Groups. *Social Psychology Quarterly*, *70*(1), 7–26.

Bielby, W. T., & Baron, J. N. (1986). Men and Women at Work: Sex Segregation and Statistical Discrimination. *American Journal of Sociology*, *91*(4), 759–799.

Billari, F. C., Ongaro, F., & Prskawetz, A. (2003). Introduction: Agent-Based Computational Demography. In F. C. Billari & A. Prskawetz (Eds.), *Agent-Based Computational Demography – Using Simulation to Improve our Understanding of Demographic Behaviour* (pp. 1–17). Heidelberg: Physica Verlag.

Bishop, B. (2008). *The Big Sort: Why the Clustering of Like-Minded America is Tearing Us Apart*. New York: Houghton Mifflin.

Blau, P. M. (1954). Co-operation and Competition in a Bureaucracy. *American Journal of Sociology*, *59*(6), 530–535.

Blau, P. M. (1964). *Exchange and Power in Social Life*. New York: Wiley.

Bonabeau, E. (2002). Agent-Based Modeling: Methods and Techniques for Simulating Human Systems. *Proceedings of the National Academy of Sciences of the United States of America*, *99*(Suppl. 3), 7280–7287.

Brashears, M. E. (2008). Sex, Society, and Association: A Cross-National Examination of Status Construction Theory. *Social Psychology Quarterly*, *71*(1), 72–85.

Brass, D. J. (1985). Technology and the Structuring of Jobs: Employee Satisfaction, Performance, and Influence. *Organizational Behavior and Human Decision Making Processes*, *35*(2), 216–240.

Brennan, G., & Pettit, P. (2004). *The Economy of Esteem: An Essay on Civil and Political Society*. Oxford: Oxford University Press.

Brown, R. (2000). Social Identity Theory: Past Achievements, Current Problems and Future Challenges. *European Journal of Social Psychology*, *30*(6), 745–778.

Carli, L. L., LaFleur, S. J., & Loeber, C. C. (1995). Nonverbal Behavior, Gender, and Influence. *Journal of Personality and Social Psychology*, *68*(6), 1030–1041.

Chen, Y., Peterson, R. S., Phillips, D. J., Podolny, J. M., & Ridgeway, C. L. (2012). Introduction to the Special Issue: Bringing Status to the Table – Attaining, Maintaining, and Experiencing Status in Organizations and Markets. *Organization Science*, *23*(2), 299–307.

Cheng, J. T., Tracy, J. L., Foulsham, T., Kingstone, A., & Heinrich, J. (2013). Two Ways to the Top: Evidence that Dominance and Prestige are Distinct yet Viable Avenues to Social Rank and Influence. *Journal of Personality and Social Psychology*, *104*(1), 103–125.

Cheng, J. T., Tracy, J. L., & Henrich, J. (2010). Pride, Personality, and the Evolutionary Foundations of Human Social Status. *Evolution and Human Behavior*, *31*(5), 334–347.

Cohen, B. P., & Zhou, X. (1991). Status Processes in Enduring Work Groups. *American Sociological Review*, *56*(2), 179–188.

Cohen, E. G. (1982). Expectation States and Interracial Interaction in School Settings. *Annual Review of Sociology*, *8*, 209–235.

Coleman, J. S. (1961). *The Adolescent Society. The Social Life of the Teenager and its Impact on Education*. New York: Free Press.

Correll, S. J. (2004). Constraints into Preferences: Gender, Status, and Emerging Career Aspirations. *American Sociological Review*, *69*(1), 93–113.

Correll, S. J., & Ridgeway, C. L. (2003). Expectation States Theory. In J. Delamater (Ed.), *Handbook of Social Psychology* (pp. 29–51). New York: Kluwer Academic/Plenum Publishers.

Daraganova, G., Pattison, P., Koskinen, J., Mitchell, B., Bill, A., Watts, M., & Baum, S. (2012). Networks and Geography: Modelling Community Network Structures as the Outcome of Both Spatial and Network Processes. *Social Networks*, *34*(1), 6–17.

Davis, J. A., & Leinhardt, S. (1972). The Structure of Positive Interpersonal Relations in Small Groups. In J. Berger, M. J. Zelditch, & B. Anderson (Eds.), *Sociological Theories in Progress* (Vol. 2, pp. 218–251). New York: Houghton Mifflin.

Doerr, K. H., Freed, T., Mitchell, T. R., Schriesheim, C. A., & Zhou, X. (2004). Work Flow Policy and Within-Worker and Between-Workers Variability in Performance. *Journal of Applied Psychology*, *89*(5), 911–921.

Dovidio, J. F., Gaertner, S. L., & Validzic, A. (1998). Intergroup Bias: Status, Differentiation, and a Common In-Group Identity. *Journal of Personality and Social Psychology*, *75*(1), 109–120.

Driskell, J. E. (1982). Personal Characteristics and Performance Expectations. *Social Psychology Quarterly*, *45*(4), 229–237.

Ellemers, N., van Rijswijk, W., Roefs, M., & Simons, C. (1997). Bias in Intergroup Perceptions: Balancing Group Identity with Social Reality. *Personality and Social Psychology Bulletin*, *23*(2), 186–198.

Epstein, J. M. (1999). Agent-Based Computational Models and Generative Social Science. *Complexity*, *4*(5), 41–60.

Epstein, J. M. (2008). Why Model? *Journal of Artificial Societies and Social Simulation*, *11*(4), 12.

Epstein, J. M., & Axtell, R. (1996). *Growing Artificial Societies: Social Science from the Bottom Up*. Washington: MIT Press.

Faris, R., & Felmlee, D. (2011). Status Struggles: Network Centrality and Gender Segregation in Same- and Cross-Gender Aggression. *American Sociological Review*, *76*(1), 48–73.

Faust, K., Entwisle, B., Rindfuss, R. R., Walsh, S. J., & Sawangdee, Y. (1999). Spatial

Arrangement of Social and Economic Networks Among Villages in Nang Rong District, Thailand. *Social Networks*, *21*(4), 311–337.

Fényes, H. (2009). Nemek szerinti iskolai eredményesség és a férfihátrány hipotézis (School Success by Gender and the Male Disadvantage Hypothesis). *Magyar Pedagógia*, *109*(1), 77–101.

Festinger, L., Schachter, S., & Back, K. (1950). *Social Pressures in Informal Groups: A Study of Human Factors in Housing*. Stanford: Stanford University Press.

Fisek, M. H., Berger, J., & Norman, R. Z. (1991). Participation in Heterogeneous and Homogeneous Groups: A Theoretical Integration. *American Journal of Sociology*, *97*(1), 114–142.

Flache, A. (1996). *The Double Edge of Networks*. Amsterdam: Thesis Publishers.

Flache, A., & Macy, M. W. (1996). The Weakness of Strong Ties: Collective Action Failure in a Highly Cohesive Group. *The Journal of Mathematical Sociology*, *21*(1-2), 3–28.

Flache, A., & Macy, M. W. (2011). Small Worlds and Cultural Polarization. *The Journal of Mathematical Sociology*, *35*(1-3), 146–176.

Flynn, F. J. (2003). How Much Should I Give and How Often? The Effects of Generosity and Frequency of Favor Exchange on Social Status and Productivity. *Academy of Management Journal*, *46*(5), 539–553.

Flynn, F. J., Reagans, R. E., Amanatullah, E. T., & Ames, D. R. (2006). Helpings One's Way to the Top: Self-Monitors Achieve Status by Helping Others and Knowing Who Helps Whom. *Journal of Personality and Social Psychology*, *91*(6), 1123–1137.

Fodor, É., & Balogh, A. (2010). Back to the Kitchen? Gender Role Attitudes in 13 East European Countries. *Journal of Family Research*, *22*(3), 289–307.

Foels, R. (2006). Ingroup Favoritism and Social Self-Esteem in Minimal Groups: Changing a Social Categorization Into a Social Identity. *Current Research in Social Psychology*, *12*(3), 38–53.

Foschi, M., Lai, L., & Sigerson, K. (1994). Gender and Double Standards in the Assessment of Job Applicants. *Social Psychology Quarterly*, *57*(4), 326–339.

Fournier, M. A. (2009). Adolescent Hierarchy Formation and the Social Competition Theory of Depression. *Journal of Social and Clinical Psychology*, *28*(9), 1144–1172.

Frank, R. H. (1985). *Choosing the Right Pond: Human Behavior and the Quest for Status*. New York: Oxford University Press.

Ghaed, S. G., & Gallo, L. C. (2007). Subjective Social Status, Objective Socioeconomic Status, and Cardiovascular Risk in Women. *Health Psychology*, *26*(6), 668–674.

Gilbert, N. (2008). *Agent-Based Models. Quantitative Applications in the Social Sciences* (Vol. 153). Thousand Oaks: Sage Publications.

Gilbert, N., & Troitzsch, K. G. (2005). *Simulation for the Social Scientist*. Berkshire: McGraw-Hill.

Gilleard, C. J., & Gurkan, A. A. (1987). Socioeconomic Development and the Status of Elderly Men In Turkey: A Test of Modernization Theory. *Journal of Gerontology*, *42*(4), 353–357.

Goode, W. J. (1979). *The Celebration of Heroes: Prestige as a Social Control System*.

Berkeley: University of California Press.

Gould, R. V. (2002). The Origins of Status Hierarchies: A Formal Theory and Empirical Test. *American Journal of Sociology*, *107*(5), 1143–1178.

Grannis, R. (2002). Discussion: Segregation Indices and Their Functional Inputs. *Sociological Methodology*, *32*(1), 69–84.

Grow, A., Flache, A., & Wittek, R. P. M. (2015). An Agent-Based Model of Status Construction in Task Focused Groups. *Journal of Artificial Societies and Social Simulation*, *18*(2), 4.

Groysberg, B., Polzer, J. T., & Elfenbein, H. A. (2010). Too Many Cooks Spoil the Broth: How High-Status Individuals Decrease Group Effectiveness. *Organization Science*, *22*(3), 722–737.

Gruenewald, T. L., Kemeny, M. E., & Aziz, N. (2006). Subjective Social Status Moderates Cortisol Responses to Social Threat. *Brain, Behavior, and Immunity*, *20*(4), 410–419.

Hadas, M. (2003). *A modern férfi születése (The Birth of Modern Man)*. Budapest: Helikon.

Halevy, N., Chou, E. Y., & Galinsky, A. D. (2011). A Functional Model of Hierarchy: Why, How, and When Vertical Differentiation Enhances Group Performance. *Organizational Psychology Review*, *1*(1), 32–52.

Handcock, M. S., Hunter, D. R., Butts, C. T., Goodreau, S. M., & Morris, M. (2008). statnet: Software Tools for the Representation, Visualization, Analysis and Simulation of Network Data. *Journal of Statistical Software*, *24*(1), 1548–7660.

Harrison, J. R., Lin, Z., Carroll, G. R., & Carley, K. M. (2007). Simulation Modeling in Organizational and Management Research. *Academy of Management Review*, *32*(4), 1229–1245.

Hendrix, L., & Hossain, Z. (1988). Women's Status and Mode of Production: A Cross-Cultural Test. *Signs*, *13*(3), 437–453.

Hewstone, M., Rubin, M., & Willis, H. (2002). Intergroup Bias. *Annual Review of Psychology*, *53*, 575–604.

Hoekman, J., Frenken, K., & Tijssen, R. J. W. (2010). Research Collaboration at a Distance: Changing Spatial Patterns of Scientific Collaboration within Europe. *Research Policy*, *39*(5), 662–673.

Hogg, M. A. (2006). Social Identity Theory. In P. J. Burke (Ed.), *Contemporary Social Psychological Theories* (pp. 111–136). Stanford: Stanford University Press.

Hopcroft, R. L. (2002). Is Gender Still a Status Characteristic? *Current Research in Social Psychology*, *7*(20), 339–346.

Hornsey, M. J. (2008). Social Identity Theory and Self-categorization Theory: A Historical Review. *Social and Personality Psychology Compass*, *2*(1), 204–222.

Huberman, B. A., Loch, C. H., & Onculer, A. (2004). Status as a Valued Resource. *Social Psychology Quarterly*, *67*(1), 103–114.

Huisman, M. (2009). Imputation of Missing Network Data: Some Simple Procedures. *Journal of Social Structure*, *10*(1).

Hunter, D. R., Goodreau, S. M., & Handcock, M. S. (2008). Goodness of Fit of Social Network Models. *Journal of the American Statistical Association*, *103*(481), 248–258.

Huo, Y. J., Binning, K. R., & Molina, L. E. (2010). Testing an Integrative Model of Respect:

Implications for Social Engagement and Well-Being. *Personality and Social Psychology Bulletin*, *36*(2), 200–212.

Hysom, S. J. (2009). Status Valued Goal Objects and Performance Expectations. *Social Forces*, *87*(3), 1623–1648.

Ishii-Kuntz, M., & Lee, G. R. (1987). Status of the Elderly: An Extension of the Theory. *Journal of Marriage and Family*, *49*(2), 413–420.

Jackson, L. A., Hunter, J. E., & Hodge, C. N. (1995). Physical Attractiveness and Intellectual Competence: A Meta-Analytic Review. *Social Psychology Quarterly*, *58*(2), 108–122.

Jasso, G. (2001). Studying Status: An Integrated Framework. *American Sociological Review*, *66*(1), 96–124.

Jones, G. R., & George, J. M. (1998). The Experience and Evolution of Trust: Implications for Cooperation and Teamwork. *Academy of Management Review*, *23*(3), 531–546.

Katz, J. S. (1994). Geographical Proximity and Scientific Collaboration. *Sociometrics*, *31*(1), 31–43.

Kenny, D. A., & La Voie, L. (1984). The Social Relations Model. In L. Berkowitz (Ed.), *Advances in Experimental Social Psychology* (Vol. 18, pp. 141–182). Orlando: Academic Press.

Kertesi, G., & Kézdi, G. (2011). Roma Employment in Hungary After the Post-Communist Transition. *Economics of Transition*, *19*(3), 563–610.

Kiggundu, M. N. (1981). Task Interdependence and the Theory of Job Design. *Academy of Management Journal*, *6*(3), 499–508.

Kiggundu, M. N. (1983). Task Interdependence and Job Design: Test of a Theory. *Organizational Behavior and Human Performance*, *31*(2), 145–172.

Kohli, A. K., Shervani, T. A., & Challagalla, G. N. (1998). Learning and Performance Orientation of Salespeople: The Role of Supervisors. *Journal of Marketing Research*, *35*(2), 263–274.

Kossinets, G. (2006). Effects of Missing Data in Social Networks. *Social Networks*, *28*(3), 247–268.

Koster, F., Stokman, F., Hodson, R., & Sanders, K. (2007). Solidarity Through Networks: The Effects of Task and Informal Interdependence on Cooperation within Teams. *Employee Relations*, *29*(2), 117–137.

Lambiotte, R., Blondel, V. D., de Kerchove, C., Huens, E., Prieur, C., Smoreda, Z., & Van Dooren, P. (2008). Geographical Dispersal of Mobile Communication Networks. *Physica A: Statistical Mechanics and Its Applications*, *387*(21), 5317–5325.

Langfred, C. W. (2004). Too Much of a Good Thing? Negative Effects of High Trust and Individual Autonomy in Self-Managing Teams. *Academy of Management Journal*, *47*(3), 385–399.

Leana, C. R., & van Buren, H. J. (1999). Organizational Social Capital and Employment Practices. *Academy of Management Review*, *24*(3), 538–555.

Lee, G. R. (1984). Status of the Elderly: Economic and Familial Antecedents. *Journal of Marriage and Family*, *46*(2), 267–275.

Legewie, J., & DiPrete, T. A. (2012). School Context and the Gender Gap in Educational

Achievement. *American Sociological Review*, *77*(3), 463–485.

Lemyre, L., & Smith, P. M. (1985). Intergroup Discrimination and Self-Esteem in the Minimal Group Paradigm. *Journal of Personality and Social Psychology*, *49*(3), 660–670.

Levin, S., Sidanius, J., Rabinowitz, J. L., & Federico, C. (1998). Ethnic Identity, Legitimizing Ideologies, and Social Status: A Matter of Ideological Asymmetry. *Political Psychology*, *19*(2), 373–404.

Loch, C. H., Galunic, D. C., & Schneider, S. (2006). Balancing Cooperation and Competition in Human Groups: The Role of Emotional Algorithms and Evolution. *Managerial and Decision Economics*, *27*(2-3), 217–233.

Loch, C. H., Huberman, B. A., & Stout, S. (2000). Status Competition and Performance in Work Groups. *Journal of Economic Behavior & Organization*, *43*(1), 35–55.

Lusher, D., Koskinen, J., & Robins, G. (Eds.). (2013). *Exponential Random Graph Models for Social Networks – Theory, Methods, and Applications*. *Structural Analysis in the Social Sciences*. Cambridge: Cambridge University Press.

Lynn, F. B., Podolny, J. M., & Tao, L. (2009). A Sociological (De)Construction of the Relationship between Status and Quality. *American Journal of Sociology*, *115*(3), 755–804.

Macy, M. W., & Flache, A. (2009). Social Dynamics From the Bottom Up: Agent-Based Models of Social interaction. In P. Hedström & P. Bearman (Eds.), *The Oxford Handbook of Analytical Sociology* (pp. 245–268). Oxford: Oxford University Press.

Macy, M. W., & Willer, R. (2002). From Factors to Actors: Computational Sociology and Agent-Based Modeling. *Annual Review of Sociology*, *28*, 143–166.

Magee, J. C., & Galinsky, A. D. (2008). Social Hierarchy: The Self-Reinforcing Nature of Power and Status. *The Academy of Management Annals*, *2*(1), 351–398.

Mannix, E. A., & Sauer, S. J. (2006). Status and Power in Organizational Group Research: Acknowledging the Pervasiveness of Hierarchy. In S. R. Thye & E. J. Lawler (Eds.), *Advances in Group Processes* (Vol. 23, pp. 149–182).

Mark, N. P., Smith-Lovin, L., & Ridgeway, C. L. (2009). Why Do Nominal Characteristics Acquire Status Value? A Minimal Explanation for Status Construction. *American Journal of Sociology*, *115*(3), 832–862.

Marmot, M. G. (2004). *The Status Syndrome: How Social Standing Affects Our Health and Longevity*. New York: Time Books.

Martin, J. L. (2009). Formation and Stabilization of Vertical Hierarchies among Adolescents: Towards a Quantitative Ethology of Dominance among Humans. *Social Psychology Quarterly*, *72*(3), 241–264.

McPherson, M., Smith-Lovin, L., & Cook, J. M. (2001). Birds of a Feather: Homophily in Social Networks. *Annual Review of Sociology*, *27*, 415–444.

Meeker, B. F. (1994). Performance Evaluations. In M. Foschi & E. J. Lawler (Eds.), *Group Processes: Sociological Analyses* (pp. 95–117). Chicago: Nelson-Hall.

Meeussen, L., & van Dijk, H. (2015). The Perceived Value of Team Players: A Longitudinal Study of How Group Identification Affects Status in Work Groups. *European Journal of Work and Organizational Psychology*, (online pre-print).

Messing, V., Neményi, M., & Zolnay, J. (2011). Hungary (Part B). In J. Szalai (Ed.), *Contested Issues of Social Inclusion through Education in Multiethnic Communities in Europe* (pp. 269–289). Budapest: Central European University, Center for Policy Studies.

Mok, D., Wellman, B., & Basu, R. (2007). Did Distance Matter before the Internet? Interpersonal Contact and Support in the 1970s. *Social Networks*, *29*(3), 430–461.

Moss-Racusin, C. A., Dovidio, J. F., Brescoll, V. L., Graham, M. J., & Handelsman, J. (2012). Science Faculty's Subtle Gender Biases favor Male Students. *Proceedings of the National Academy of Sciences of the United States of America*, *109*(41), 16474–16479.

Nagy, I. (2006). Measuring the Global Gender Gap: An International Comparison. In I. Nagy, M. Pongrácz, & I. G. Tóth (Eds.), *Changing Roles: Report on the Situation of Women and Men in Hungary 2005* (pp. 192–205). Budapest: TÁRKI Social Research Institute.

Neményi, M. (2007). Serdülő roma gyerekek identitás-stratégiái (Adolescent Identity Strategies for Roma Children). *Educatio*, *16*(1), 84–98.

Niles, S., & Hanson, S. (2003). The Geographies of Online Job Search: Preliminary Findings from Worcester, MA. *Environment and Planning A*, *35*(7), 1223–1243.

Nosek, B. A., Banaji, M. R., & Greenwald, A. G. (2002). Math = Male, Me = Female, therefore Math ≠ Me. *Journal of Personality and Social Psychology*, *83*(1), 44–59.

Oakes, P. J., & Turner, J. C. (1980). Social Categorization and Intergroup Behaviour: Does Minimal Intergroup Discrimination Make Social Identity more Positive? *European Journal of Social Psychology*, *10*(3), 295–301.

OECD. (2012). *Closing the Gender Gap: Act Now*. OECD publishing.

Oldmeadow, J. A., & Fiske, S. T. (2010). Social Status and the Pursuit of Positive Social Identity: Systematic Domains of Intergroup Differentiation and Discrimination for High- and Low-Status Groups. *Group Processes and Intergroup Relations*, *13*(4), 425–444.

Oldmeadow, J. A., Platow, M. J., Foddy, M., & Anderson, D. (2003). Self-Categorization, Status, and Social Influence. *Social Psychology Quarterly*, *66*(2), 138–152.

Parks, F. R., & Kennedy, J. H. (2007). The Impact of Race, Physical Attractiveness, and Gender, on Education Majors' and Teachers' Perceptions of Student Competence. *Journal of Black Studies*, *37*(6), 936–943.

Pearce, J. L. (2010). Introduction: The Power of Status. In J. L. Pearce (Ed.), *Status in Management and Organizations* (pp. 1–22). Cambridge, UK: Cambridge University Press.

Phelps, E. S. (1972). The Statistical Theory of Racism and Sexism. *The American Economic Review*, *62*(4), 659–661.

Ponds, R., Van Oort, F., & Frenken, K. (2007). The Geographical and Institutional Proximity of Research Collaboration. *Papers in Regional Science*, *86*(3), 423–443.

Porath, C. L., Overbeck, J. R., & Pearson, C. M. (2008). Picking Up the Gauntlet: How Individuals Respond to Status Challenges. *Journal of Applied Social Psychology*, *38*(7), 1945–1980.

Powers, R. S., Suitor, J. J., Guerra, S., Shackelford, M., Mecom, D., & Gusman, K. (2003). Regional Differences in Gender-Role Attitudes: Variations by Gender and Race. *Gender Issues*, *21*(2), 40–54.

Preciado, P., Snijders, T. A. B., Burk, W. J., Stattin, H., & Kerr, M. (2012). Does Proximity

Matter? Distance Dependence of Adolescent Friendships. *Social Networks*, *34*(1), 18–31.

Pustejovsky, J. E., & Spillane, J. P. (2009). Question-Order Effects in Social Network Name Generators. *Social Networks*, *31*(4), 221–229.

R Core Team. (2014). R: A Language and Environment for Statistical Computing. Vienna, Austria: R Foundation for Statistical Computing.

Rashotte, L. S., & Webster, M. (2005). Gender Status Beliefs. *Social Science Research*, *34*(3), 618–633.

Rice, T. W., & Coates, D. L. (1995). Gender Role Attitudes in the Southern United States. *Gender and Society*, *9*(6), 744–756.

Richiardi, M., Leombruni, R., Saam, N., & Sonnessa, M. (2006). A Common Protocol for Agent-Based Social Simulation. *Journal of Artificial Societies and Social Simulation*, *9*(1), 15.

Ridgeway, C. L. (1987). Nonverbal Behavior, Dominance, and the Basis of Status in Task Groups. *American Sociological Review*, *52*(5), 683–694.

Ridgeway, C. L. (1991). The Social Construction of Status Value: Gender and Other Nominal Characteristics. *Social Forces*, *70*(2), 367–386.

Ridgeway, C. L. (2000). The Formation of Status Beliefs: Improving Status Construction Theory. In S. R. Thye & E. J. Lawler (Eds.), *Advances in Group Processes* (Vol. 17, pp. 77–102).

Ridgeway, C. L. (2011). *Framed By Gender – How Gender Inequality Persists in the Modern World*. Oxford: Oxford University Press.

Ridgeway, C. L. (2014). Why Status Matters for Inequality. *American Sociological Review*, *79*(1), 1–16.

Ridgeway, C. L., Backor, K., Li, Y. E., Tinkler, J. E., & Erickson, K. G. (2009). How Easily Does a Social Difference Become a Status Distinction? Gender Matters. *American Sociological Review*, *74*(1), 44–62.

Ridgeway, C. L., & Balkwell, J. W. (1997). Group Processes and the Diffusion of Status Beliefs. *Social Psychology Quarterly*, *60*(1), 14–31.

Ridgeway, C. L., Boyle, E. H., Kuipers, K. J., & Robinson, D. T. (1998). How Do Status Beliefs Develop? The Role of Resources and Interactional Experience. *American Sociological Review*, *63*(3), 331–350.

Ridgeway, C. L., & Correll, S. J. (2006). Consensus and the Creation of Status Beliefs. *Social Forces*, *85*(1), 431–453.

Ridgeway, C. L., & Erickson, K. G. (2000). Creating and Spreading Status Beliefs. *American Journal of Sociology*, *106*(3), 579–615.

Robins, G., & Lusher, D. (2013). Illustrations: Simulation, Estimation, and Goodness of Fit. In D. Lusher, J. Koskinen, & G. Robins (Eds.), *Exponential Random Graph Models for Social Networks – Theory, Methods, and Applications* (pp. 167–185). Cambridge: Cambridge University Press.

Robins, G., Pattison, P., Kalish, Y., & Lusher, D. (2007). An Introduction to Exponential Random Graph (p*) Models for Social Networks. *Social Networks*, *29*(2), 173–191.

Rouwendal, J. (1999). Spatial Job Search and Commuting Distances. *Regional Science and*

Urban Economics, *29*(4), 491–517.

Sackett, P. R., & Larson, J. R. (1990). Research Strategies and Tactics in Industrial and Organizational Psychology. In M. D. Dunnette & L. M. Hough (Eds.), *Handbook of Industrial and Organizational Psychology* (2nd ed., pp. 419–489). Palo Alto: Consulting Psychologists Press.

Sailer, K., & McCulloh, I. (2012). Social Networks and Spatial Configuration: How Office Layouts Drive Social Interaction. *Social Networks*, *34*(1), 47–58.

Sanderson, S. K., Heckert, D. A., & Dubrow, J. K. (2005). Militarist, Marxian, and Non-Marxian Materialist Theories of Gender Inequality: A Cross-Cultural Test. *Social Forces*, *83*(4), 1425–1441.

Schmader, T. (2002). Gender Identification Moderates Stereotype Threat Effects on Women's Math Performance. *Journal of Experimental Social Psychology*, *38*(2), 194–201.

Skvoretz, J. (1988). Models of Participation in Status-Differentiated Groups. *Social Psychology Quarterly*, *51*(1), 43–57.

Skvoretz, J., & Fararo, T. J. (1996). Status and Participation in Task Groups: A Dynamic Network Model. *American Journal of Sociology*, *101*(5), 1366–1414.

Skvoretz, J., Faust, K., & Fararo, T. J. (1996). Social Structure, Networks, and E-State Structuralism Models. *The Journal of Mathematical Sociology*, *21*(1-2), 57–76.

Snijders, T. A. B., & Baerveldt, C. (2003). A Multilevel Network Study of the Effects of Delinquent Behavior on Friendship Evolution. *The Journal of Mathematical Sociology*, *27*(2-3), 123–151.

Spagnolo, G. (1999). Social Relations and Cooperation in Organizations. *Journal of Economic Behavior and Organization*, *38*(1), 1–25.

Steele, C. M. (1997). A Threat is in the Air: How Stereotypes Shape Intellectual Identity and Performance. *American Psychologist*, *52*(6), 613–629.

Steele, C. M., & Aronson, J. (1995). Stereotype Threat and the Intellectual Test Performance of African Americans. *Journal of Personality and Social Psychology*, *69*(5), 797–811.

Stover, R. G., & Hope, C. A. (1984). Monotheism and Gender Status: A Cross-Societal Study. *Social Forces*, *63*(2), 335–348.

Strodtbeck, F. L., James, R. M., & Hawkins, C. (1957). Social Status in Jury Deliberations. *American Sociological Review*, *22*(6), 713–719.

Strodtbeck, F. L., & Mann, R. D. (1956). Sex Role Differentiation in Jury Deliberations. *Sociometry*, *19*(1), 3–11.

Székelyi, M., Örkény, A., & Csepeli, G. (2001). Romakép a mai magyar társadalomban (The Picture of Roma in Today's Hungarian Society). *Szociológiai Szemle*, *11*(3), 19–46.

Taggar, S., & Haines, V. Y. (2006). I Need You, You Need Me: A Model of Initiated Task Interdependence. *Journal of Managerial Psychology*, *21*(3), 211–230.

Tajfel, H., & Turner, J. C. (1979). An Integrative Theory of Intergroup Conflict. In W. G. Austin & S. Worchel (Eds.), *The Social Psychology of Intergroup Relations* (pp. 33–47). Monterey: Brooks/Cole.

Tay, L., & Diener, E. (2011). Needs and Subjective Well-Being Around the World. *Journal of Personality and Social Psychology*, *101*(2), 354–365.

Tesser, A., & Campbell, J. (1982). Self-Evaluation Maintenance and the Perception of Friends and Strangers. *Journal of Personality*, *50*(3), 261–279.

Tesser, A., Campbell, J., & Smith, M. (1984). Friendship Choice and Performance: Self-Evaluation Maintenance in Children. *Journal of Personality and Social Psychology*, *46*(3), 561–574.

Thye, S. R., Willer, D., & Markovsky, B. (2006). From Status to Power: New Models at the Intersection of two Theories. *Social Forces*, *84*(3), 1471–1495.

van Buuren, S., & Groothuis-Oudshoorn, K. (2011). mice: Multivariate Imputation by Chained Equations in R. *Journal of Statistical Software*, *45*(3), 1–67.

Van der Vegt, G. S., Emans, B. J. M., & Van de Vliert, E. (2001). Patterns of Interdependence in Work Teams: A Two-Level Investigation of the Relations with Job and Team Satisfaction. *Personnel Psychology*, *54*(1), 51–69.

Van der Vegt, G. S., Emans, B., & Van de Vliert, E. (1998). Motivating Effects of Task Outcome Interdependence in Work Teams. *Group and Organization Management*, *23*(2), 124–143.

Van der Vegt, G. S., & Van de Vliert, E. (2002). Intragroup Interdependence and Effectiveness: Review and Proposed Directions for Theory and Practice. *Journal of Managerial Psychology*, *17*(1), 50–67.

Wageman, R., & Gordon, M. F. (2005). As the Twig is Bent: How Group Values Shape Emergent Task Interdependence in Groups. *Organization Science*, *16*(6), 687–700.

Wagner, D. G., & Berger, J. (2002). Expectation States Theory: An Evolving Research Program. In J. Berger & M. J. Zelditch (Eds.), *New Directions in Contemporary Sociological Theory* (pp. 41–76). Lanham: Rowman & Littlefield.

Waldherr, A., & Wijermans, N. (2013). Communicating Social Simulation to Skeptical Minds. *Journal of Artificial Societies and Social Simulation*, *16*(4), 13.

Waldron, D. A. (1998). Status in Organizations: Where Evolutionary Theory Ranks. *Managerial and Decision Economics*, *19*(7/8), 505–520.

Webster, M., & Driskell, J. E. (1985). Status Generalization. In J. Berger & M. Zelditch (Eds.), *Status, Rewards, and Influence: How Expectations Organize Behavior* (pp. 108–141). San Francisco: Jossey Bass.

Webster, M., & Foschi, M. (1988). Overview of Status Generalization. In M. Webster & M. Foschi (Eds.), *Status Generalization: New Theory and Research* (pp. 1–25). Stanford: Stanford University Press.

Webster, M., & Hysom, S. J. (1998). Creating status characteristics. *American Sociological Review*, *63*(3), 351–378.

Webster, M., & Rashotte, L. S. (2010). Behavior, Expectations and Status. *Social Forces*, *88*(3), 1021–1049.

White, M. J. (1983). The Measurement of Spatial Segregation. *American Journal of Sociology*, *88*(5), 1008–1018.

Wilensky, U. (1999). NetLogo. Evanston, IL: Center for Connected Learning and Computer-Based Modeling, Northwestern University.

Willer, R. (2009). A Status Theory of Collective Action. In S. R. Thye & E. J. Lawler (Eds.),

Advances in Group Processes (Vol. 26, pp. 133–163).

Wittek, R. P. M. (1999). *Interdependence and Informal Control in Organizations*. Amsterdam: ThelaThesis.

Wong, L. H., Pattison, P., & Robins, G. (2006). A Spatial Model for Social Networks. *Physica A: Statistical Mechanics and Its Applications*, *360*(1), 99–120.

York, E., & Cornwell, B. (2006). Status on Trial: Social Characteristics and Influence in the Jury Room. *Social Forces*, *85*(1), 455–477.

Acknowledgements

During my work on this dissertation, I encountered many people whom I would like to thank for their support, help, and company.

First and foremost, I would like to thank my supervisors Rafael Wittek and Andreas Flache. Without their continuing support and encouragement, this dissertation would never have been realized. Our meetings and discussion were invaluable to the progress of my research and minted my view on sociological science. I am particularly thankful for the freedom they have given me to develop myself as an independent researcher and to learn about new research methods. This had a profound effect on the path of my academic career and I hope that in the future we can continue our collaboration.

I also owe big thanks to the ICS, especially to the members of the Department of Sociology of Groningen University. The discussions in the research group meetings, colloquia, and forum days created a very stimulating atmosphere. I increasingly realize that this should not be taken for granted and I hope that the ICS will be able to maintain this inspiring environment. My research also benefited from the infrastructure that exists in Groningen, in particular from the support of Saskia Simon, Monique Heuvel, and Henry Been, who would always lend me a helping hand in organizational matters. I enjoyed my time in Groningen very much, not least because of the sociable nature of my colleagues there. I especially thank Michael Mäs, Tobias Stark, Beau Oldenburg, and Tali Spiegel for making my years in Groningen so enjoyable.

During my time at the ICS I also had the opportunity to visit other research institutions. In 2011, Károly Takács and Judit Pál invited me to visit the Research Center for Educational and Network Studies of Corvinus University Budapest, Hungary. I would like to thank them for the inspiring time I had in Budapest and for their efforts in organizing and financing my stay. I also would like to thank the other members of the sociology research group at Corvinus University who made my time there unforgettable. In 2012, Karen Cook invited me to visit the Institute for Research in the Social Sciences of Stanford University, USA, where I attended the meetings of the research group on social psychology. I am very thankful for the valuable feedback that I received during these meetings, in particular from Karen Cook, Cecilia Ridgeway, and Shelly Correll.

Collecting the data that I have used in the second part of this dissertation would not have been possible without the help of my colleagues Thomas Kowalewski, Joringel Den Hoedt, and Alona Labun. I am thankful for their time and effort. I also would like to thank the respondents for participating in the survey. I am also very thankful for the Research Center for Educational and Network Studies for giving me access to their data for use in this dissertation.

My way to Groningen started with my Bachelor studies at Heinrich Heine University Düsseldorf and continued with my Master Studies at Utrecht University. At these Universities I greatly benefited from the supervision of Michael Baurman, Bernhard Miebach, Beate Völker, and Henk Flap. I am particularly grateful for the support of Bernhard Miebach, without whom my studies at Utrecht University would not have been possible. I am also grateful for the additional support by the German Academic Exchange Service for my studies there.

I would also like to thank the members of the assessment committee, Vincent Buskens, Cecilia Ridgeway, and Tom Snijders for taking their time to read and assess this dissertation.

An dieser Stelle möchte ich auch Herbert, Petra, René und Bianca, sowie Tina, Wolfgang und Lisa für ihre Ermutigung und ihren Beistand während meiner Zeit in Düsseldorf, Utrecht und Groningen danken. Schließlich möchte ich noch einem ganz besonderen Menschen in meinem Leben danken. Henrike, ich danke dir für deine Unterstützung und Liebe, die über all die Jahre des Studiums und der Fernbeziehung angehalten haben, auch wenn es sicher nicht immer leicht mit mir war.

Curriculum Vitae

André Grow was born in Düsseldorf, Germany, on January 27, 1983. After obtaining his Bachelor's degree in Social Sciences at Heinrich Heine University Düsseldorf in 2007, he moved to the Netherlands to follow the prestige research master program Sociology and Social Research at Utrecht University with a scholarship from the German Academic Exchange Service. He obtained his Research Master's degree *cum laude* in 2009 and in the same year started working as a Ph.D. researcher at the Interuniversity Centre for Social Science Theory and Methodology (ICS) at the Department of Sociology of Groningen University, the Netherlands. As part of his Ph.D. trajectory, in 2011 he conducted a two-month research visit at the Research Center for Educational and Network Studies of Corvinus University Budapest, Hungary, with a scholarship from the TÁMOP project. In 2012, he conducted a two-month research visit at the Institute for Research in the Social Sciences of Stanford University, USA. In September 2013, he took up a position as a researcher at the Centre for Sociological Research of Leuven University, Belgium.

ICS Dissertation Series

The ICS series presents dissertations of the Interuniversity Center for Social Science Theory and Methodology. Each of these studies aims at integrating explicit theory formation with state of the art empirical research or at the development of advanced methods for empirical research. The ICS was founded in 1986 as a cooperative effort of the universities of Groningen and Utrecht. Since 1992, the ICS expanded to the University of Nijmegen. Most of the projects are financed by the participating universities or by the Netherlands Organization for Scientific Research (NWO). The international composition of the ICS graduate students is mirrored in the increasing international orientation of the projects and thus of the ICS series itself.

1. Cornelis van Liere (1990). *Lastige leerlingen. Een empirisch onderzoek naar sociale oorzaken van probleemgedrag op basisscholen.* Amsterdam: Thesis Publishers.
2. Marco H.D. van Leeuwen (1990). *Bijstand in Amsterdam, ca. 1800-1850. Armenzorg als beheersings- en overlevingsstrategie.* ICS-dissertation, Utrecht.
3. Ineke Maas (1990). *Deelname aan podiumkunsten via de podia, de media en actieve beoefening. Substitutie of leereffecten?* Amsterdam: Thesis Publishers.
4. Marjolein I. Broese van Groenou (1991). *Gescheiden netwerken. De relaties met vrienden en verwanten na echtscheiding.* Amsterdam: Thesis Publishers.
5. Jan M.M. van den Bos (1991). *Dutch EC policy making. A model guided approach to coordination and negotiation.* Amsterdam: Thesis Publishers.
6. Karin Sanders (1991). *Vrouwelijke pioniers. Vrouwen en mannen met een 'mannelijke' hogere beroepsopleiding aan het begin van hun loopbaan.* Amsterdam: Thesis Publishers.
7. Sjerp de Vries (1991). *Egoism, altruism, and social justice. Theory and experiments on cooperation in social dilemmas.* Amsterdam: Thesis Publishers.
8. Ronald S. Batenburg (1991). *Automatisering in bedrijf.* Amsterdam: Thesis Publishers.
9. Rudi Wielers (1991). *Selectie en allocatie op de arbeidsmarkt. Een uitwerking voor de informele en geïnstitutionaliseerde kinderopvang.* Amsterdam: Thesis Publishers.
10. Gert P. Westert (1991). *Verschillen in ziekenhuisgebruik.* ICS-dissertation, Groningen.
11. Hanneke Hermsen (1992). *Votes and policy preferences. Equilibria in party systems.* Amsterdam: Thesis Publishers.
12. Cora J.M. Maas (1992). *Probleemleerlingen in het basisonderwijs.* Amsterdam: Thesis Publishers.
13. Ed A.W. Boxman (1992). *Contacten en carrière. Een empirisch theoretisch onderzoek naar de relatie tussen sociale netwerken en arbeidsmarktposities.* Amsterdam: Thesis Publishers.
14. Conny G.J. Taes (1992). *Kijken naar banen. Een onderzoek naar de inschatting van arbeidsmarktkansen bij schoolverlaters uit het middelbaar beroepsonderwijs.* Amsterdam: Thesis Publishers.

15. Peter van Roozendaal (1992). *Cabinets in multi party democracies. The effect of dominant and central parties on cabinet composition and durability.* Amsterdam: Thesis Publishers.
16. Marcel van Dam (1992). *Regio zonder regie. Verschillen in en effectiviteit van gemeentelijk arbeidsmarktbeleid.* Amsterdam: Thesis Publishers.
17. Tanja van der Lippe (1993). *Arbeidsverdeling tussen mannen en vrouwen.* Amsterdam: Thesis Publishers.
18. Marc A. Jacobs (1993). *Software: Kopen of kopiëren? Een sociaal wetenschappelijk onderzoek onder PC gebruikers.* Amsterdam: Thesis Publishers.
19. Peter van der Meer (1993). *Verdringing op de Nederlandse arbeidsmarkt. Sector- en sekseverschillen.* Amsterdam: Thesis Publishers.
20. Gerbert Kraaykamp (1993). *Over lezen gesproken. Een studie naar sociale differentiatie in leesgedrag.* Amsterdam: Thesis Publishers.
21. Evelien Zeggelink (1993). *Strangers into friends. The evolution of friendship networks using an individual oriented modeling approach.* Amsterdam: Thesis Publishers.
22. Jaco Berveling (1994). *Het stempel op de besluitvorming. Macht, invloed en besluitvorming op twee Amsterdamse beleidsterreinen.* Amsterdam: Thesis Publishers.
23. Wim Bernasco (1994). *Coupled careers. The effects of spouse's resources on success at work.* Amsterdam: Thesis Publishers.
24. Liset van Dijk (1994). *Choices in child care. The distribution of child care among mothers, fathers and non parental care providers.* Amsterdam: Thesis Publishers.
25. Jos de Haan (1994). *Research groups in Dutch sociology.* Amsterdam: Thesis Publishers.
26. Kwasi Boahene (1995). *Innovation adoption as a socio economic process. The case of the Ghanaian cocoa industry.* Amsterdam: Thesis Publishers.
27. Paul E.M. Ligthart (1995). *Solidarity in economic transactions. An experimental study of framing effects in bargaining and contracting.* Amsterdam: Thesis Publishers.
28. Roger Th. A.J. Leenders (1995). *Structure and influence. Statistical models for the dynamics of actor attributes, network structure, and their interdependence.* Amsterdam: Thesis Publishers.
29. Beate Völker (1995). *Should auld acquaintance be forgot...? Institutions of communism, the transition to capitalism and personal networks: the case of East Germany.* Amsterdam: Thesis Publishers.
30. Anna M. Cancrinus Matthijsse (1995). *Tussen hulpverlening en ondernemerschap. Beroepsuitoefening en taakopvattingen van openbare apothekers in een aantal West Europese landen.* Amsterdam: Thesis Publishers.
31. Nardi Steverink (1996). *Zo lang mogelijk zelfstandig. Naar een verklaring van verschillen in oriëntatie ten aanzien van opname in een verzorgingstehuis onder fysiek kwetsbare ouderen.* Amsterdam: Thesis Publishers.
32. Ellen Lindeman (1996). *Participatie in vrijwilligerswerk.* Amsterdam: Thesis Publishers.
33. Chris Snijders (1996). *Trust and commitments.* Amsterdam: Thesis Publishers.

34. Koos Postma (1996). *Changing prejudice in Hungary. A study on the collapse of state socialism and its impact on prejudice against gypsies and Jews.* Amsterdam: Thesis Publishers.
35. Jooske T. van Busschbach (1996). *Uit het oog, uit het hart? Stabiliteit en verandering in persoonlijke relaties.* Amsterdam: Thesis Publishers.
36. René Torenvlied (1996). *Besluiten in uitvoering. Theorieën over beleidsuitvoering modelmatig getoetst op sociale vernieuwing in drie gemeenten.* Amsterdam: Thesis Publishers.
37. Andreas Flache (1996). *The double edge of networks. An analysis of the effect of informal networks on cooperation in social dilemmas.* Amsterdam: Thesis Publishers.
38. Kees van Veen (1997). *Inside an internal labor market: Formal rules, flexibility and career lines in a Dutch manufacturing company.* Amsterdam: Thesis Publishers.
39. Lucienne van Eijk (1997). *Activity and well being in the elderly.* Amsterdam: Thesis Publishers.
40. Róbert Gál (1997). *Unreliability. Contract discipline and contract governance under economic transition.* Amsterdam: Thesis Publishers.
41. Anne Geerte van de Goor (1997). *Effects of regulation on disability duration.* ICS-dissertation, Utrecht.
42. Boris Blumberg (1997). *Das Management von Technologiekooperationen. Partnersuche und Verhandlungen mit dem Partner aus empirisch theoretischer Perspektive.* ICS-dissertation, Utrecht.
43. Marijke von Bergh (1997). *Loopbanen van oudere werknemers.* Amsterdam: Thesis Publishers.
44. Anna Petra Nieboer (1997). *Life events and well being: A prospective study on changes in well being of elderly people due to a serious illness event or death of the spouse.* Amsterdam: Thesis Publishers.
45. Jacques Niehof (1997). *Resources and social reproduction: The effects of cultural and material resources on educational and occupational careers in industrial nations at the end of the twentieth century.* ICS-dissertation, Nijmegen.
46. Ariana Need (1997). *The kindred vote. Individual and family effects of social class and religion on electoral change in the Netherlands, 1956-1994.* ICS-dissertation, Nijmegen.
47. Jim Allen (1997). *Sector composition and the effect of education on wages: an international Comparison.* Amsterdam: Thesis Publishers.
48. Jack B.F. Hutten (1998). *Workload and provision of care in general practice. An empirical study of the relation between workload of Dutch general practitioners and the content and quality of their Care.* ICS-dissertation, Utrecht.
49. Per B. Kropp (1998). *Berufserfolg im Transformationsprozeß. Eine theoretisch empirische Studie über die Gewinner und Verlierer der Wende in Ostdeutschland.* ICS-dissertation, Utrecht.
50. Maarten H.J. Wolbers (1998). *Diploma inflatie en verdringing op de arbeidsmarkt. Een studie naar ontwikkelingen in de opbrengsten van diploma's in Nederland.* ICS-dissertation, Nijmegen.

51. Wilma Smeenk (1998). *Opportunity and marriage. The impact of individual resources and marriage market structure on first marriage timing and partner choice in the Netherlands.* ICS-dissertation, Nijmegen.
52. Marinus Spreen (1999). *Sampling personal network structures: Statistical inference in ego-graphs.* ICS-dissertation, Groningen.
53. Vincent Buskens (1999). *Social networks and trust.* ICS-dissertation, Utrecht.
54. Susanne Rijken (1999). *Educational expansion and status attainment. A cross-national and over-time comparison.* ICS-dissertation, Utrecht.
55. Mérove Gijsberts (1999). *The legitimation of inequality in state-socialist and market societies, 1987-1996.* ICS-dissertation, Utrecht.
56. Gerhard G. Van de Bunt (1999). *Friends by choice. An actor-oriented statistical network model for friendship networks through time.* ICS-dissertation, Groningen.
57. Robert Thomson (1999). *The party mandate: Election pledges and government actions in the Netherlands, 1986-1998.* Amsterdam: Thela Thesis.
58. Corine Baarda (1999). *Politieke besluiten en boeren beslissingen. Het draagvlak van het mestbeleid tot 2000.* ICS-dissertation, Groningen.
59. Rafael Wittek (1999). *Interdependence and informal control in organizations.* ICS-dissertation, Groningen.
60. Diane Payne (1999). *Policy making in the European Union: An analysis of the impact of the reform of the structural funds in Ireland.* ICS-dissertation, Groningen.
61. René Veenstra (1999). *Leerlingen-klassen-scholen. Prestaties en vorderingen van leerlingen in het voortgezet onderwijs.* Amsterdam, Thela Thesis.
62. Marjolein Achterkamp (1999). *Influence strategies in collective decision making. A comparison of two models.* ICS-dissertation, Groningen.
63. Peter Mühlau (2000). *The governance of the employment relation. A relational signaling perspective.* ICS-dissertation, Groningen.
64. Agnes Akkerman (2000). *Verdeelde vakbeweging en stakingen. Concurrentie om leden.* ICS-dissertation, Groningen.
65. Sandra van Thiel (2000). *Quangocratization: Trends, causes and consequences.* ICS-dissertation, Utrecht.
66. Rudi Turksema (2000). *Supply of day care.* ICS-dissertation, Utrecht.
67. Sylvia E. Korupp (2000). *Mothers and the process of social stratification.* ICS-dissertation, Utrecht.
68. Bernard A. Nijstad (2000). *How the group affects the mind: Effects of communication in idea generating groups.* ICS-dissertation, Utrecht.
69. Inge F. de Wolf (2000). *Opleidingsspecialisatie en arbeidsmarktsucces van sociale wetenschappers.* ICS-dissertation, Utrecht.
70. Jan Kratzer (2001). *Communication and performance: An empirical study in innovation teams.* ICS-dissertation, Groningen.
71. Madelon Kroneman (2001). *Healthcare systems and hospital bed use*. ICS/NIVEL-dissertation, Utrecht.

72. Herman van de Werfhorst (2001). *Field of study and social inequality. Four types of educational resources in the process of stratification in the Netherlands.* ICS-dissertation, Nijmegen.
73. Tamás Bartus (2001). *Social capital and earnings inequalities. The role of informal job search in Hungary.* ICS-dissertation Groningen.
74. Hester Moerbeek (2001). *Friends and foes in the occupational career. The influence of sweet and sour social capital on the labour market.* ICS-dissertation, Nijmegen.
75. Marcel van Assen (2001). *Essays on actor perspectives in exchange networks and social dilemmas.* ICS-dissertation, Groningen.
76. Inge Sieben (2001). *Sibling similarities and social stratification. The impact of family background across countries and cohorts.* ICS-dissertation, Nijmegen.
77. Alinda van Bruggen (2001). *Individual production of social well being. An exploratory study.* ICS-dissertation, Groningen.
78. Marcel Coenders (2001). *Nationalistic attitudes and ethnic exclusionism in a comparative perspective: An empirical study of attitudes toward the country and ethnic immigrants in 22 countries.* ICS-dissertation, Nijmegen.
79. Marcel Lubbers (2001). *Exclusionistic electorates. Extreme right wing voting in Western Europe.* ICS-dissertation, Nijmegen.
80. Uwe Matzat (2001). *Social networks and cooperation in electronic communities. A theoretical-empirical analysis of academic communication and internet discussion groups.* ICS-dissertation, Groningen.
81. Jacques P.G. Janssen (2002). *Do opposites attract divorce? Dimensions of mixed marriage and the risk of divorce in the Netherlands.* ICS-dissertation, Nijmegen.
82. Miranda Jansen (2002). *Waardenoriëntaties en partnerrelaties. Een panelstudie naar wederzijdse invloeden.* ICS-dissertation, Utrecht.
83. Anne Rigt Poortman (2002). *Socioeconomic causes and consequences of divorce.* ICS-dissertation, Utrecht.
84. Alexander Gattig (2002). *Intertemporal decision making.* ICS-dissertation, Groningen.
85. Gerrit Rooks (2002). *Contract en conflict: Strategisch Management van Inkooptransacties.* ICS-dissertation, Utrecht.
86. Károly Takács (2002). *Social networks and intergroup conflict.* ICS-dissertation, Groningen.
87. Thomas Gautschi (2002). *Trust and exchange, effects of temporal embeddedness and network embeddedness on providing and dividing a surplus.* ICS-dissertation, Utrecht.
88. Hilde Bras (2002). *Zeeuwse meiden. Dienen in de levensloop van vrouwen, ca. 1850-1950.* Aksant Academic Publishers, Amsterdam.
89. Merijn Rengers (2002). *Economic lives of artists. Studies into careers and the labour market in the cultural sector.* ICS-dissertation, Utrecht.
90. Annelies Kassenberg (2002). *Wat scholieren bindt. Sociale gemeenschap in scholen.* ICS-dissertation, Groningen.

91. Marc Verboord (2003). *Moet de meester dalen of de leerling klimmen? De invloed van literatuuronderwijs en ouders op het lezen van boeken tussen 1975 en 2000.* ICS-dissertation, Utrecht.
92. Marcel van Egmond (2003). *Rain falls on all of us (but some manage to get more wet than others): Political context and electoral participation.* ICS-dissertation, Nijmegen.
93. Justine Horgan (2003). *High performance human resource management in Ireland and the Netherlands: Adoption and effectiveness.* ICS-dissertation, Groningen.
94. Corine Hoeben (2003). *LETS' be a community. Community in Local Exchange Trading Systems.* ICS-dissertation, Groningen.
95. Christian Steglich (2003). *The framing of decision situations. Automatic goal selection and rational goal pursuit.* ICS-dissertation, Groningen.
96. Johan van Wilsem (2003). *Crime and context. The impact of individual, neighborhood, city and country characteristics on victimization.* ICS-dissertation, Nijmegen.
97. Christiaan Monden (2003). *Education, inequality and health. The impact of partners and life course.* ICS-dissertation, Nijmegen.
98. Evelyn Hello (2003). *Educational attainment and ethnic attitudes. How to explain their relationship.* ICS-dissertation, Nijmegen.
99. Marnix Croes en Peter Tammes (2004). *Gif laten wij niet voortbestaan. Een onderzoek naar de overlevingskansen van joden in de Nederlandse gemeenten, 1940-1945.* Aksant Academic Publishers, Amsterdam.
100. Ineke Nagel (2004). *Cultuurdeelname in de levensloop*. ICS-dissertation, Utrecht.
101. Marieke van der Wal (2004). *Competencies to participate in life. Measurement and the impact of school.* ICS-dissertation, Groningen.
102. Vivian Meertens (2004). *Depressive symptoms in the general population: a multifactorial social approach.* ICS-dissertation, Nijmegen.
103. Hanneke Schuurmans (2004). *Promoting well-being in frail elderly people. Theory and intervention.* ICS-dissertation, Groningen.
104. Javier Arregui (2004). *Negotiation in legislative decision-making in the European Union.* ICS-dissertation, Groningen.
105. Tamar Fischer (2004). *Parental divorce, conflict and resources. The effects on children's behaviour problems, socioeconomic attainment, and transitions in the demographic career.* ICS-dissertation, Nijmegen.
106. René Bekkers (2004). *Giving and volunteering in the Netherlands: Sociological and psychological perspectives.* ICS-dissertation, Utrecht.
107. Renée van der Hulst (2004). *Gender differences in workplace authority: An empirical study on social networks.* ICS-dissertation, Groningen.
108. Rita Smaniotto (2004). *'You scratch my back and I scratch yours' versus 'Love Thy neighbour'. Two proximate mechanisms of reciprocal altruism.* ICS-dissertation, Groningen.
109. Maurice Gesthuizen (2004). *The life-course of the low-educated in the Netherlands: Social and economic risks.* ICS-dissertation, Nijmegen.

110. Carlijne Philips (2005). *Vakantiegemeenschappen. Kwalitatief en kwantitatief onderzoek naar gelegenheid en refreshergemeenschap tijdens de vakantie.* ICS-dissertation, Groningen.
111. Esther de Ruijter (2005). *Household outsourcing.* ICS-dissertation, Utrecht.
112. Frank van Tubergen (2005). *The integration of immigrants in cross-national perspective: Origin, destination, and community effects.* ICS-dissertation, Utrecht.
113. Ferry Koster (2005). *For the time being. Accounting for inconclusive findings concerning the effects of temporary employment relationships on solidary behavior of employees.* ICS-dissertation, Groningen.
114. Carolien Klein Haarhuis (2005). *Promoting anti-corruption reforms. Evaluating the implementation of a World Bank anti-corruption program in seven African countries (1999-2001).* ICS-dissertation, Utrecht.
115. Martin van der Gaag (2005). *Measurement of individual social capital.* ICS-dissertation, Groningen.
116. Johan Hansen (2005). *Shaping careers of men and women in organizational contexts.* ICS-dissertation, Utrecht.
117. Davide Barrera (2005). *Trust in embedded settings.* ICS-dissertation, Utrecht.
118. Mattijs Lambooij (2005). *Promoting cooperation. Studies into the effects of long-term and short-term rewards on cooperation of employees.* ICS-dissertation, Utrecht.
119. Lotte Vermeij (2006). *What's cooking? Cultural boundaries among Dutch teenagers of different ethnic origins in the context of school.* ICS-dissertation, Utrecht.
120. Mathilde Strating (2006). *Facing the challenge of rheumatoid arthritis. A 13-year prospective study among patients and a cross-sectional study among their partners.* ICS-dissertation, Groningen.
121. Jannes de Vries (2006). *Measurement error in family background variables: The bias in the intergenerational transmission of status, cultural consumption, party preference, and religiosity.* ICS-dissertation, Nijmegen.
122. Stefan Thau (2006). *Workplace deviance: Four studies on employee motives and self-regulation.* ICS-dissertation, Groningen.
123. Mirjam Plantinga (2006). *Employee motivation and employee performance in child care. The effects of the introduction of market forces on employees in the Dutch child-care sector.* ICS-dissertation, Groningen.
124. Helga de Valk (2006). *Pathways into adulthood. A comparative study on family life transitions among migrant and Dutch Youth.* ICS-dissertation, Utrecht.
125. Henrike Elzen (2006). *Self-management for chronically ill older people.* ICS-Dissertation, Groningen.
126. Ayse Güveli (2007). *New social classes within the service class in the Netherlands and Britain. Adjusting the EGP class schema for the technocrats and the social and cultural specialists.* ICS-dissertation, Nijmegen.
127. Willem-Jan Verhoeven (2007). *Income attainment in post-communist societies.* ICS-dissertation, Utrecht.

128. Marieke Voorpostel (2007). *Sibling support: The exchange of help among brothers and sisters in the Netherlands.* ICS-dissertation, Utrecht.
129. Jacob Dijkstra (2007). *The effects of externalities on partner choice and payoffs in exchange networks.* ICS-dissertation, Groningen.
130. Patricia van Echtelt (2007). *Time-greedy employment relationships: Four studies on the time claims of post-Fordist work.* ICS-dissertation, Groningen.
131. Sonja Vogt (2007). *Heterogeneity in social dilemmas: The case of social support.* ICS-dissertation, Utrecht.
132. Michael Schweinberger (2007). *Statistical methods for studying the evolution of networks and behavior.* ICS-dissertation, Groningen.
133. István Back (2007). *Commitment and evolution: Connecting emotion and reason in long-term relationships.* ICS-dissertation, Groningen.
134. Ruben van Gaalen (2007). *Solidarity and ambivalence in parent-child relationships.* ICS-dissertation, Utrecht.
135. Jan Reitsma (2007). *Religiosity and solidarity – Dimensions and relationships disentangled and tested.* ICS-dissertation, Nijmegen.
136. Jan Kornelis Dijkstra (2007). *Status and affection among (pre)adolescents and their relation with antisocial and prosocial behavior.* ICS-dissertation, Groningen.
137. Wouter van Gils (2007). *Full-time working couples in the Netherlands. Causes and consequences.* ICS-dissertation, Nijmegen.
138. Djamila Schans (2007). *Ethnic diversity in intergenerational solidarity.* ICS-dissertation, Utrecht.
139. Ruud van der Meulen (2007). *Brug over woelig water: Lidmaatschap van sportverenigingen, vriendschappen, kennissenkringen en veralgemeend vertrouwen.* ICS-dissertation, Nijmegen.
140. Andrea Knecht (2008). *Friendship selection and friends' influence. Dynamics of networks and actor attributes in early adolescence.* ICS-dissertation, Utrecht.
141. Ingrid Doorten (2008). *The division of unpaid work in the household: A stubborn pattern?* ICS-dissertation, Utrecht.
142. Stijn Ruiter (2008). *Association in context and association as context: Causes and consequences of voluntary association involvement.* ICS-dissertation, Nijmegen.
143. Janneke Joly (2008). *People on our minds: When humanized contexts activate social norms.* ICS-dissertation, Groningen.
144. Margreet Frieling (2008). *'Joint production' als motor voor actief burgerschap in de buurt.* ICS-dissertation, Groningen.
145. Ellen Verbakel (2008). *The partner as resource or restriction? Labour market careers of husbands and wives and the consequences for inequality between couples.* ICS-dissertation, Nijmegen.
146. Gijs van Houten (2008). *Beleidsuitvoering in gelaagde stelsels. De doorwerking van aanbevelingen van de Stichting van de Arbeid in het CAO-overleg.* ICS-dissertation, Utrecht.

147. Eva Jaspers (2008). *Intolerance over time. Macro and micro level questions on attitudes towards euthanasia, homosexuality and ethnic minorities.* ICS-dissertation, Nijmegen.
148. Gijs Weijters (2008). *Youth delinquency in Dutch cities and schools: A multilevel approach.* ICS-dissertation, Nijmegen.
149. Jessica Pass (2009). *The self in social rejection.* ICS-dissertation, Groningen.
150. Gerald Mollenhorst (2009). *Networks in contexts. How meeting opportunities affect personal relationships.* ICS-dissertation, Utrecht.
151. Tom van der Meer (2009). *States of freely associating citizens: Comparative studies into the impact of state institutions on social, civic and political participation.* ICS-dissertation, Nijmegen.
152. Manuela Vieth (2009). *Commitments and reciprocity in trust situations. Experimental studies on obligation, indignation, and self-consistency.* ICS-dissertation, Utrecht.
153. Rense Corten (2009). *Co-evolution of social networks and behavior in social dilemmas: Theoretical and empirical perspectives.* ICS-dissertation, Utrecht.
154. Arieke J. Rijken (2009). *Happy families, high fertility? Childbearing choices in the context of family and partner relationships.* ICS-dissertation, Utrecht.
155. Jochem Tolsma (2009). *Ethnic hostility among ethnic majority and minority groups in the Netherlands. An investigation into the impact of social mobility experiences, the local living environment and educational attainment on ethnic hostility.* ICS-dissertation, Nijmegen.
156. Freek Bucx (2009). *Linked lives: Young adults' life course and relations with parents.* ICS-dissertation, Utrecht.
157. Philip Wotschack (2009). *Household governance and time allocation. Four studies on the combination of work and care.* ICS-dissertation, Groningen.
158. Nienke Moor (2009). *Explaining worldwide religious diversity. The relationship between subsistence technologies and ideas about the unknown in pre-industrial and (post-) industrial societies.* ICS-dissertation, Nijmegen.
159. Lieke ten Brummelhuis (2009). *Family matters at work. Depleting and enriching effects of employees' family lives on work outcomes.* ICS-dissertation, Utrecht.
160. Renske Keizer (2010). *Remaining childless. Causes and consequences from a life Course Perspective.* ICS-dissertation, Utrecht.
161. Miranda Sentse (2010). *Bridging contexts: The interplay between family, child, and peers in explaining problem behavior in early adolescence.* ICS-dissertation, Groningen.
162. Nicole Tieben (2010). *Transitions, tracks and transformations. Social inequality in transitions into, through and out of secondary education in the Netherlands for cohorts born between 1914 and 1985.* ICS-dissertation, Nijmegen.
163. Birgit Pauksztat (2010). *Speaking up in organizations: Four studies on employee voice.* ICS-dissertation, Groningen.
164. Richard Zijdeman (2010). *Status attainment in the Netherlands, 1811-1941. Spatial and temporal variation before and during industrialization.* ICS-dissertation, Utrecht.

165. Rianne Kloosterman (2010). *Social background and children's educational careers. The and secondary effects of social background over transitions and over time in the Netherlands.* ICS-dissertation, Nijmegen.
166. Olav Aarts (2010). *Religious diversity and religious involvement. A study of religious markets in Western societies at the end of the twentieth century.* ICS-dissertation, Nijmegen.
167. Stephanie Wiesmann (2010). *24/7 Negotiation in couples transition to parenthood.* ICS-dissertation, Utrecht.
168. Borja Martinovic (2010). *Interethnic contacts: A dynamic analysis of interaction between immigrants and natives in Western countries.* ICS-dissertation, Utrecht.
169. Anne Roeters (2010). *Family life under pressure? Parents' paid work and the quantity and quality of parent-child and family time.* ICS-dissertation, Utrecht.
170. Jelle Sijtsema (2010). *Adolescent aggressive behavior: Status and stimulation goals in relation to the peer context.* ICS-dissertation, Groningen.
171. Kees Keizer (2010). *The spreading of disorder.* ICS-dissertation, Groningen.
172. Michael Mäs (2010). *The diversity puzzle. Explaining clustering and polarization of opinions.* ICS-dissertation, Groningen.
173. Marie-Louise Damen (2010). *Cultuurdeelname en CKV. Studies naar effecten van kunsteducatie op de cultuurdeelname van leerlingen tijdens en na het voortgezet onderwijs.* ICS-dissertation, Utrecht.
174. Marieke van de Rakt (2011). *Two generations of crime: The intergenerational transmission of convictions over the life course.* ICS-dissertation, Nijmegen.
175. Willem Huijnk (2011). *Family life and ethnic attitudes. The role of the family for attitudes towards intermarriage and acculturation among minority and majority groups.* ICS-dissertation, Utrecht.
176. Tim Huijts (2011). *Social ties and health in Europe. Individual associations, cross-national variations, and contextual explanations.* ICS-dissertation, Nijmegen.
177. Wouter Steenbeek (2011). *Social and physical Disorder. How community, business presence and entrepreneurs influence disorder in Dutch neighborhoods.* ICS-dissertation, Utrecht.
178. Miranda Vervoort (2011). *Living together apart? Ethnic concentration in the neighborhood and ethnic minorities' social contacts and language practices.* ICS-dissertation, Utrecht.
179. Agnieszka Kanas (2011). *The economic performance of immigrants. The role of human and social capital.* ICS-dissertation, Utrecht.
180. Lea Ellwardt (2011). *Gossip in organizations. A social network study.* ICS-dissertation, Groningen.
181. Annemarije Oosterwaal (2011). *The gap between decision and implementation. Decision making, delegation and compliance in governmental and organizational settings.* ICS-dissertation, Utrecht.
182. Natascha Notten (2011). *Parents and the media. Causes and consequences of parental media socialization.* ICS-dissertation, Nijmegen.

183. Tobias Stark (2011). *Integration in schools. A process perspective on students' interethnic attitudes and interpersonal relationships.* ICS-dissertation, Groningen.
184. Giedo Jansen (2011). *Social cleavages and political choices. Large-scale comparisons of social class, religion and voting behavior in Western democracies.* ICS-dissertation, Nijmegen.
185. Ruud van der Horst (2011). *Network effects on treatment results in a closed forensic psychiatric setting.* ICS-dissertation, Groningen.
186. Mark Levels (2011). *Abortion laws in European countries between 1960 and 2010. Legislative developments and their consequences for women's reproductive decision-making.* ICS-dissertation, Nijmegen.
187. Marieke van Londen (2012). *Exclusion of ethnic minorities in the Netherlands. The effects of individual and situational characteristics on opposition to ethnic policy and ethnically mixed neighbourhoods.* ICS-dissertation, Nijmegen.
188. Sigrid M. Mohnen (2012). *Neighborhood context and health: How neighborhood social capital affects individual health.* ICS-dissertation, Utrecht.
189. Asya Zhelyazkova (2012). *Compliance under controversy: analysis of the transposition of European directives and their provisions.* ICS-dissertation, Utrecht.
190. Valeska Korff (2012). *Between cause and control: Management in a humanitarian organization.* ICS-dissertation, Groningen.
191. Maike Gieling (2012). *Dealing with diversity: Adolescents' support for civil liberties and immigrant rights.* ICS-dissertation, Utrecht.
192. Katya Ivanova (2012). *From parents to partners: The impact of family on romantic relationships in adolescence and emerging adulthood.* ICS-dissertation, Groningen.
193. Jelmer Schalk (2012). *The performance of public corporate actors: Essays on effects of institutional and network embeddedness in supranational, national, and local collaborative contexts.* ICS-dissertation, Utrecht.
194. Alona Labun (2012). *Social networks and informal power in organizations.* ICS-dissertation, Groningen.
195. Michal Bojanowski (2012). *Essays on social network formation in heterogeneous populations: Models, methods, and empirical analyses.* ICS-dissertation, Utrecht.
196. Anca Minescu (2012). *Relative group position and intergroup attitudes in Russia.* ICS-dissertation, Utrecht.
197. Marieke van Schellen (2012). *Marriage and crime over the life course. The criminal careers of convicts and their spouses.* ICS-dissertation, Utrecht.
198. Mieke Maliepaard (2012). *Religious trends and social integration: Muslim minorities in the Netherlands.* ICS-dissertation, Utrecht.
199. Fransje Smits (2012). *Turks and Moroccans in the Low Countries around the year 2000: Determinants of religiosity, trend in religiosity and determinants of the trend.* ICS-dissertation, Nijmegen.
200. Roderick Sluiter (2012). *The diffusion of morality policies among Western European countries between 1960 and 2010. A comparison of temporal and spatial diffusion patterns of six morality and eleven non-morality policies.* ICS-dissertation, Nijmegen.

201. Nicoletta Balbo (2012). *Family, friends and fertility.* ICS-dissertation, Groningen.
202. Anke Munniksma (2013). *Crossing ethnic boundaries: Parental resistance to and consequences of adolescents' cross-ethnic peer relations.* ICS-dissertation, Groningen.
203. Anja Abendroth (2013). *Working women in Europe. How the country, workplace, and family context matter.* ICS-dissertation, Utrecht.
204. Katia Begall (2013). *Occupational hazard? The relationship between working conditions and fertility.* ICS-dissertation, Groningen.
205. Hidde Bekhuis (2013). *The popularity of domestic cultural products: Cross-national differences and the relation to globalization.* ICS-dissertation, Utrecht.
206. Lieselotte Blommaert (2013). *Are Joris and Renske more employable than Rashid and Samira? A study on the prevalence and sources of ethnic discrimination in recruitment in the Netherlands using experimental and survey data.* ICS-dissertation, Utrecht.
207. Wiebke Schulz (2013). *Careers of men and women in the 19th and 20th centuries.* ICS-dissertation, Utrecht.
208. Ozan Aksoy (2013). *Essays on social preferences and beliefs in non-embedded social dilemmas.* ICS-dissertation, Utrecht.
209. Dominik Morbitzer (2013). *Limited farsightedness in network formation.* ICS-dissertation, Utrecht.
210. Thomas de Vroome (2013). *Earning your place: The relation between immigrants' economic and psychological integration in the Netherlands.* ICS-dissertation, Utrecht.
211. Marloes de Lange (2013). *Causes and consequences of employment flexibility among young people. Recent developments in the Netherlands and Europe.* ICS-dissertation, Nijmegen.
212. Roza Meuleman (2014). *Consuming the nation. Domestic cultural consumption: its stratification and relation with nationalist attitudes.* ICS-dissertation, Utrecht.
213. Esther Havekes (2014). *Putting interethnic attitudes in context. The relationship between neighbourhood characteristics, interethnic attitudes and residential behaviour.* ICS-dissertation, Utrecht.
214. Zoltán Lippényi (2014). *Transitions toward an open society? Intergenerational occupational mobility in Hungary in the 19th and 20th centuries.* ICS-dissertation, Utrecht.
215. Anouk Smeekes (2014). *The presence of the past: Historical rooting of national identity and current group dynamics.* ICS-dissertation, Utrecht.
216. Michael Savelkoul (2014). *Ethnic diversity and social capital. Testing underlying explanations derived from conflict and contact theories in Europe and the United States.* ICS-dissertation, Nijmegen.
217. Martijn Hogerbrugge (2014). *Misfortune and family: How negative events, family ties, and lives are linked.* ICS-dissertation, Utrecht.
218. Gina Potarca (2014). *Modern love. Comparative insights in online dating preferences and assortative mating.* ICS-dissertation, Groningen.
219. Mariska van der Horst (2014). *Gender, aspirations, and achievements: Relating work and family aspirations to occupational outcomes.* ICS-dissertation, Utrecht.

220. Gijs Huitsing (2014). *A Social network perspective on bullying*. ICS dissertation, Groningen.
221. Thomas Kowalewski (2015). *Personal growth in organizational contexts.* ICS-dissertation, Groningen.
222. Manu Muñoz-Herrera (2015). *The impact of individual differences on network relations: Social exclusion and inequality in productive exchange and coordination games.* ICS-dissertation, Groningen.
223. Tim Immerzeel (2015). *Voting for a change. The democratic lure of populist radical right parties in voting behavior.* ICS-dissertation, Utrecht.
224. Fernando Nieto Morales (2015). *The control imperative: Studies on reorganization in the public and private sectors.* ICS-dissertation, Groningen.
225. Jellie Sierksma (2015). *Bounded helping: How morality and intergroup relations shape children's reasoning about helping.* ICS-dissertation, Utrecht.
226. Tinka Veldhuis (2015). *Captivated by fear. An evaluation of terrorism detention policy.* ICS-dissertation, Groningen.
227. Miranda Visser (2015). *Loyality in humanity. Turnover among expatriate humanitarian aid workers.* ICS-dissertation, Groningen.
228. Sarah Westphal (2015). *Are the kids alright? Essays on postdivorce residence arrangements and children's well-being.* ICS-dissertation, Utrecht.
229. Britta Rüschoff (2015). *Peers in careers*: *Peer relationships in the transition from school to work.* ICS-dissertation, Groningen.
230. Nynke van Miltenburg (2015). *Cooperation under peer sanctioning institutions: Collective decisions, noise, and endogenous implementation.* ICS-dissertation, Utrecht.
231. Antonie Knigge (2015). *Sources of sibling similarity. Status attainment in the Netherlands during modernization.* ICS-dissertation, Utrecht.
232. Sanne Smith (2015). *Ethnic segregation in friendship networks. Studies of its determinants in English, German, Dutch, and Swedish school classes.* ICS-dissertation, Utrecht.
233. Patrick Präg (2015). *Social stratification and health. Four essays on social determinants of health and wellbeing*. ICS dissertation, Groningen.
234. Wike Been (2015). *European top managers' support for work-life arrangements.* ICS dissertation, Utrecht
235. André Grow (2016). *Status differentiation: New insights from agent-based modeling and social network analysis.* ICS dissertation, Groningen

This study addresses two questions that are at the core of sociology: how are status differences between individuals created and why does status often derive from characteristics such as gender, race, and age? André Grow examines these questions in two parts. In the first part, he focuses on the processes by which characteristics such as gender and race attain status value. Classical sociological theory holds that salient social distinctions can attain status value when the members of one group possess more valuable resources than members of another group. Drawing on recent insights from status construction theory and using agent-based computational modeling, the author argues that status differences between social groups can easily emerge from face-to-face interactions in small group contexts, even without resource differences. The spread of status differences throughout society is constrained, however, by the geographic clustering of such interactions. In the second part, he empirically studies the conditions under which status differences emerge between individuals. Existing research suggests that status differences emerge from pressures to coordinate collaborative work in task focused settings. Applying methods of social network analysis to data collected in organizational teams and school classes, Grow finds that in teams status differentiation depends on the level of task interdependence that team members experience and that in school classes status differentiation can emerge even in the absence of a task focus.

André Grow obtained his Research Master's degree in sociology and social research at the University of Utrecht, graduating *cum laude*. He conducted the present study as part of his Ph.D. research at the Interuniversity Centre for Social Science Theory and Methodology (ICS) and the Department of Sociology of the University of Groningen.

ISBN: 978-90-367-8481-8