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by

Julian Dormann
Thomas Ehrmann
Michael Kopel

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Max Planck Institute of Economics
Evolutionary Economics Group
Kahlaische Str. 10
07745 Jena, Germany
Fax: ++49-3641-686868

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Julian Dormann
Westfälische Wilhelms-Universität Münster
Institute of Strategic Management
Münster, Germany

Thomas Ehrmann
Westfälische Wilhelms-Universität Münster
Institute of Strategic Management
Münster, Germany

Michael Kopel
Vienna University of Technology
Institute of Management Science
Vienna, Austria

Abstract

Management scholars have long stressed the importance of evolutionary processses for inter-firm cooperation but have mostly missed the promising opportunity to incorporate ideas from evolutionary theories into the analysis of collaborative arrangements. In this paper, we first present three rules for the evolution of cooperation – kinship selection, direct reciprocity, and indirect reciprocity. Second, we apply our theoretical considerations, enriched with ideas from cultural anthropology, to the context of a specific and particularly attractive type of cooperative arrangement, the franchise form of organization. Third, we provide a preliminary empirical test with regards to conditions under which evolutionary modes can secure cooperative behavior. We conclude by summarizing our results and deriving fertile areas for further research.

Introduction

The formation of alliances and networks is now a common way to organize interfirm relationships. Strategic management research has recognized this trend and has tried to explain interfirm cooperation on the basis of transaction costs, agency costs, competitiveness, trust and related constructs such as social capital (e.g., Uzzi, 1997; Gulati, 1998; Ireland et al., 2002). However, one point of criticism of these streams of literature has been raised early by Doz (1996: p. 55-56): "The growing literature on the strategic alliance phenomenon suffers from imbalance. While the importance of evolutionary processes is well recognized in many subfields of management and of organization theory […], studies of strategic alliances as evolutionary processes are scarce. […] Game theorists point to interesting evolutionary features of behavior in cooperation experiments (e.g., Axelrod, 1984), but the applicability of their analysis to interorganizational relationships remains untested." In other words, the field of strategic management – though having a tradition in postulating the importance of long-term collaborations for gaining competitive advantages (Dyer and Singh, 1998; Gulati, 2000; Zollo et al., 2005) – has up to now mostly missed the promising opportunity to fully incorporate ideas from evolutionary (game) theories into the analysis of interfirm cooperation. Furthermore, contributions oftentimes seem to lack a rigorous presentation of arguments in the form of conceptual or mathematical models. For these reasons, the pre-conditions and detailed mechanisms for cooperation (the "rules of the game") relevant for the *dynamic evolution and proliferation* of cooperative behavior in interfirm relationships still remain under-researched and not clearly formalized.

Although some authors have contributed to close this gap in strategy research[1], in this paper we try to promote a more broad approach to the emergence of cooperation in interfirm alliances based on the combination of two bodies of literature, namely management theory

[1] For example, Parkhe (1993), Cable and Shane (1997), and more recently, Arend and Seale (2005) and Hanaki et al. (2007), employ an iterated prisoners' dilemma approach to analyze alliance activity and the emergence of interfirm cooperation. On the other hand, Cowan et al. (2007) study an agent-based model of network formation.

and evolutionary theory. Recent research in evolutionary (game) theory has offered a variety of pathways to the establishment of cooperative behavior (e.g., Gintis et al., 2001; Fehr et al., 2002; Henrich, 2003; Henrich and Henrich, 2006; Nowak, 2006b). This strand of literature is appealing for management scholars since it does not only identify evolutionary mechanisms (like kinship, direct and indirect reciprocity; see below) which provide solutions for the dilemma of cooperation, but it also rigorously reveals an explicit calculus for the prevalence of cooperation in terms of a cost-benefit consideration. In addition, we refer to recent work from the field of evolutionary theory complementing these insights (e.g., Henrich, 2003; Henrich and Henrich, 2006), which indicates that *culture* or fast operating *cultural transmission mechanisms* might serve as a link between evolutionary reasoning and managerial perspectives on collaborations.

Hence, to further our understanding of the emergence of cooperative behavior in alliances and networks, we connect theories of different degrees of abstraction, evolutionary (game) theory and cultural anthropology, and show their sound applicability to real-life economic phenomena such as network organizations. By doing so, we aim at offering a novel framework for approaching the question of how to manage the evolution of cooperation.

The paper is structured as follows. In the next section, we discuss circumstances under which cooperative behavior might develop and present three evolutionary models of cooperation: kinship selection, direct reciprocity, and indirect reciprocity. We enrich these principles by referring to newer insights on the influence of cultural transmission mechanisms like prestige-biased and conformist transmission. We then proceed to outline the applicability of our theoretical considerations in the context of a specific and particularly attractive type of cooperative arrangement, the franchise form of organization. We provide a preliminary empirical test with regards to working conditions that should influence the functionality of evolutionary rules for cooperation in securing inter-franchisee collaboration. Finally, we conclude by summarizing our results and by deriving areas for further research.

An Evolutionary Explanation of Cooperation in Alliances and Networks

As strategic alliances are potentially unstable and are quite frequently terminated due to internal tensions and conflicting forces (Das and Teng, 2000), understanding the main mechanisms which allow the evolution of cooperation is important for alliance management (Ireland et al., 2002). In this section we want to present the main evolutionary principles which describe how cooperation can develop and be sustained. We enrich these principles by referring to newer insights on the influence of cultural transmission mechanisms like prestige-biased and conformist transimission.

We consider a population of individuals, e.g. member firms of a strategic alliance, where each individual has the option to cooperate, i.e. help another individual, or to defect, i.e. provide no help. The recipient of the altruistic act receives a benefit of b. Helping someone is costly, however. We represent the cost to the donor by c. For cooperation to make any sense, it is assumed that $c<b$. Let us now describe the payoffs occurring in an interaction between two individuals. If a cooperator meets another cooperator, both receive the benefit b, but have to pay the cost c for helping each other. Therefore, the payoff to both of them is $b–c$. If only one player helps and the other does not, then the defector receives the benefit without paying the cost, whereas the donor pays the cost without receiving the benefit. This yields b for the defector and $–c$ for the donor. If both players do not help each other, the payoff is 0 for both. Hence, writing down the payoff matrix of an interaction between cooperators and defectors, we obtain

$$\begin{array}{cc} & \begin{array}{cc} C & D \end{array} \\ \begin{array}{c} C \\ D \end{array} & \begin{pmatrix} (b-c, b-c) & (-c, b) \\ (b, -c) & (0,0) \end{pmatrix} \end{array}. \tag{1}$$

Given that the decision-making environment of the players is characterized by this payoff matrix, cooperation will not be observed among rational players. The reason is that no matter what the other player is doing, it is always better for a player to defect (in other words, defection is a dominant strategy). The unique Nash equilibrium predicts defection of both players, hence receiving a payoff of *0*. This is not too surprising, since our payoff matrix can be related to the prisoner's dilemma game by setting the reward for mutual cooperation $R=b-c$, the temptation to defect $T=b$, the sucker's payoff $S=-c$, and the punishment for mutual defection P=0, and we have $T=b>R=b-c>P=0>S=-c$, as required for a prisoner's dilemma game (see e.g. Axelrod and Hamilton, 1981; Nowak, 2006a). Hence, the rationality of the players leads to defection of both players. The prisoner's dilemma framework has been used frequently by management scholars to capture the essence of social dilemmas and to gain insights into the evolution of cooperation in interfirm relations, see e.g. Parkhe (1993), Cable and Shane (1997), Das and Teng (2000), Arend and Seale (2005), and Hanaki et al. (2007).

Note that even if we let natural selection work and consider how the share of cooperators and defectors in a population of boundedly rational players evolves over time, the same result emerges. To see this, imagine a mixed population of cooperators and defectors. Let the frequency of cooperators in the population be x and the frequency of defectors be $1-x$. Then given the payoff matrix in (1), the average payoff (or the fitness) of a cooperator is $f_C(x)=(b-c)x+(-c)(1-x)=bx-c$ and the fitness of a defector is $f_D(x)=bx$. Therefore, defectors dominate cooperators (in terms of fitness). If we assume that higher payoff strategies displace lower payoff strategies, the frequency of defectors will steadily increase until all cooperators have become extinct. This can also be demonstrated by referring to the so-called replicator dynamics.[2] Defection is an evolutionary stable strategy (see e.g. Weibull, 1995, for a formal definition) and, therefore, a population of defectors cannot be invaded by a (small) group of cooperators.

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[2] The replicator dynamics says that if a strategy earns an above-average payoff, then its share in the population increases, whereas otherwise it decreases. Formally, $\dot{x}=x[f_C(x)-\overline{f}]$, where $\dot{x}$ represents the change in the share of cooperators and $\overline{f}=xf_C+(1-x)f_D=(b-c)x$ is the average payoff in the population. Substitution leads to the differential equation $\dot{x}=-cx(1-x)$, which shows that the percentage of cooperators will decline steadily (since the right-hand side is always negative).

Since cooperation cannot develop in a situation captured by the payoff matrix presented in (1), further mechanisms are required. Evolutionary theories of cooperation provide a surprisingly simple core principle for the emergence of cooperation, namely that cooperation can evolve when circumstances are such that cooperators tend to cooperate with other cooperators. To put it differently, cooperation can evolve under circumstances which allow cooperators to bestow benefits preferentially on cooperators (Henrich and Henrich, 2006; Nowak, 2006b). Formally, this can be expressed by the condition $\beta b > c$, where the coefficient β measures the degree to which 'being a cooperator' predicts 'bestowing benefits on other cooperators' (see Henrich, 2003; Henrich and Henrich, 2006). In the simplest case, β can be interpreted as the probability of bestowing benefits on another cooperator, but in the remainder of this section we will present three different principles, kin selection, direct reciprocity, and indirect reciprocity, and illustrate that the coefficient β either represents the share of interactions among related individuals, or the probability that the interaction with the same individual will continue to the next round, or the probability of knowing the reputation of another player.

The principles all show how cooperation can evolve and ultimately dominate in a population of (boundedly rational) players. Our exposition is based on Nowak (2006b; see also the supporting online material) and on Henrich and Henrich (2006). Throughout we make references to related work in evolutionary (game) theory and cooperation in strategic alliances as well. To overcome some of the well-known problems (e.g. incomplete information, large groups) of applying these principles to management issues, we make reference to new insights in evolutionary theory on cultural transmission mechanisms and how they lead to the evolution of cooperation and its stability.

Kin Selection and Inclusive Fitness

One mechanism through which cooperation can develop is the "relatedness of players", where in the context of strategic alliances and networks "relatedness" is used only in a metaphoric sense. As both social psychology and organizational learning research have revealed, individuals or firms are generally more attracted to others who resemble themselves (e.g., Byrne, 1969; Chung et al., 2000; Darr and Kurtzberg, 2000). Individuals are more open to similar others due to better possibilities for validating and assimilating received information, reduced cognitive dissonance, and increased predictability of behavior, for instance (e.g., Jackson et al., 1991; Cable and Shane, 1997). Accordingly, research on potential solutions to the prisoner's dilemma has indicated that cooperation is more likely to emerge if actors show high degrees of homogeneity (e.g., Pruitt and Kimmel, 1977; Cable and Shane, 1997). Furthermore, demographic similarity also encourages cooperation (see also Henrich and Henrich, 2006). McPherson et al. (2001) put it this way: "We are more likely to have contact with those who are closer to us in geographic location than those who are distant." (p. 429). In terms of effort this means that "It takes more energy to connect to those who are far away than those who are readily available." (p. 429).

To describe the game among related players we can employ the idea that interactions among related players are more likely.[3] Let the share of each players' interactions with its relatives be r, where the relatives use the same strategy as the player.[4] The other share of interactions of a player, $1–r$, is assumed to be with random individuals from the population,

[3] A second, more direct, way to introduce relatedness, uses the concept of inclusive fitness. This concept is taken from evolutionary biology, where fitness denotes the capability of genetic information to spread in a population. Inclusive fitness also considers the contribution stemming from all alleles in the gene pool which are shared by an individual and its relatives. Consider now a measure for the relatedness of individuals, r, which is a number between 0 and 1. Then, inclusive fitness is composed of the fitness (the direct payoff) of the focal individual enhanced by the contribution from the relative, which is given by the relative's payoff multiplied by the relatedness measure r. Using this idea it can be shown that the fitness of cooperators is higher than the fitness of defectors if $r>c/b$. In this case cooperation is an evolutionary stable strategy and dynamically stable with respect to the replicator dynamics. The mathematical details can be obtained from the authors upon request.

[4] We here understand relatedness as the probability of sharing the same strategic orientation (i.e., cooperation vs. defection) which is reflected by or even rooted in common traits, such as shared cultural backgrounds, experiences, attitudes, and the like. Concepts from evolutionary theory and sociology offer similar insights, in particular, "green beard" models (e.g., Dawkins, 1976) and "homophily" in human societies (e.g., McPherson et al., 2001).

where these other players can either be cooperators or defectors. We denote the frequency of cooperators in the population as *x* and the frequency of defectors as *1–x*. Then, given the payoff matrix in (1), the average payoff (the fitness) of a cooperator is $f_C(x) = r(b-c) + (1-r)x(b-c) + (1-r)(1-x)(-c)$. On the other hand, the fitness of a defector is $f_D(x) = r0 + (1-r)xb + (1-r)(1-x)0 = (1-r)xb$. The linear fitness functions just described can be obtained from a payoff matrix of the form

$$\begin{array}{c} \\ C \\ D \end{array}\!\!\begin{array}{c} \begin{array}{cc} C & D \end{array} \\ \begin{pmatrix} f_C(1) & f_C(0) \\ f_D(1) & f_D(0) \end{pmatrix} \end{array} = \begin{array}{c} \\ C \\ D \end{array}\!\!\begin{array}{c} \begin{array}{cc} C & D \end{array} \\ \begin{pmatrix} (b-c, b-c) & (br-c, b(1-r)) \\ (b(1-r), br-c) & (0,0) \end{pmatrix} \end{array}, \tag{2}$$

which captures the interaction between players in a population where related players have a fixed share of encounters with each other and they select the same strategy. The question now is, what is the critical share of interactions between relatives such that cooperation can develop? It is easy to see that cooperators dominate defectors if *br–c>0*. In this case the fitness of cooperators is higher than the fitness of defectors and cooperation is a dominant strategy. If the share of interactions among related individuals exceeds the cost-benefit ration, *r>c/b*, then cooperation can develop. Under this condition, cooperation is an evolutionary stable strategy and the replicator dynamics shows that cooperation is dynamically stable.

In the literature on evolutionary biology, the condition *r>c/b* is referred to as Hamilton's rule (Hamilton, 1964), and obviously the share of interactions among related individuals, *r*, replaces the coefficient β in the core principle presented above. In terms of this core principle the interpretation of the "relatedness condition" is that individuals take the evidence like similarity (e.g. cultural aspects) or geographical proximity as cues to assess the likelihood that they are bestowing benefits on another cooperator. The derivations above have been kept intentionally simple, but recent work shows that this rule also plays an important role for the evolution of altruism in the standard *n*-player's prisoner's dilemma (Fletcher and Zwick, 2007). The authors demonstrate that the parameters in an *n*-player Prisoner's Dilemma game can be explicitly connected to the concept of inclusive fitness, Hamilton's rule, and multilevel selection theory, where the r-value in their derivation is expressed as the between-group variance over total variance in the cooperative trait. Hamilton's rule in multilevel selection theory is fundamental for understanding assortment and (variance in) group selection. The productivity of groups with a high proportion of cooperators is higher than the productivity of groups with fewer cooperators, and this variance in productivity favors groups with a high share of cooperators in the between-group selection process. For more details we refer to Fletcher and Zwick (2007).

Direct Reciprocity (or "If you scratch my back I scratch yours")

Direct reciprocity describes a mechanism which allows cooperation to emerge when there are repeated encounters between the *same* two individuals. That the frequency of interactions and the time horizon over which encounters between individuals occur matter for the stability of interfirm relationships has been demonstrated before by Kogut (1989), Parkhe (1993), Cable and Shane (1997), Das and Teng (2000), among others. Moreover, since the Prisoner's Dilemma framework also "[…] addresses the social context in which the parties are embedded […]" (Cable and Shane, 1997: p 147), the concept of direct reciprocity is related to the relational embeddedness or cohesion perspectives on networks, where the latter emphasize the direct ties between actors as a source of information about behavior and expectations (see Gulati, 1998; Cowan et al., 2007).

To see how repeated interactions can lead to cooperation, consider again the payoff matrix given in (1), but now assume that the individuals play the game repeatedly. The probability that the next round of the game is played is denoted by w, and therefore the game ends with probability $1-w$. What is a good strategy to play this repeated game? The set of all strategies consists of rules assigning the decision to cooperate or to defect to any history of the game. So obviously, the dimension of this strategy space is enormous (cf. Nowak, 2006a).

Hence, here we focus on the well-known strategy Tit-for-tat (TFT), which has been proven to be robust and very successful in simulated computer tournaments (Axelrod and Hamilton, 1981; Nowak, 2006a). TFT starts with cooperation and then replicates what the other player did in the previous round. Although very simple, it can be proven that, once established, TFT cannot be invaded by any other strategy if the probability *w* of meeting again is sufficiently large (Axelrod and Hamilton, 1981). Hence, TFT is evolutionary stable and cooperation prevails in the population.[5] To give a flavor of the arguments, let us consider TFT playing against the strategy ALLD, a strategy which always defects. Given that the average (or expected) number of rounds played is *1/(1-w)*, the payoff matrix of the repeated game is

$$\begin{array}{cc} & \begin{array}{cc} \quad TFT \quad & \quad ALLD \quad \end{array} \\ \begin{array}{c} TFT \\ ALLD \end{array} & \begin{pmatrix} (\frac{b-c}{1-w}, \frac{b-c}{1-w}) & (-c,\ b) \\ (b,\ -c) & (0,\ 0) \end{pmatrix} \end{array}, \tag{3}$$

since TFT versus TFT leads to mutual cooperation and all the other encounters lead to defection with a future payoff of *0*. The question now arises if TFT is evolutionary stable, i.e if it is stable against invasion by ALLD. Using the replicator equation, it is easy to see that (TFT, TFT) is stable if $(b–c)/(1–w)>b$, which shows that TFT can resist invasion if $w>c/b$. In other words, if the "shadow of the future" (Parkhe, 1993; Das and Teng, 2000) is rather long, then cooperation can prevail.

Relating this result back to the core principle in evolutionary theories of cooperation, it is obvious that *w*, the probability that the interaction with the same individual will continue to the next round, replaces the coefficient β. Clearly, the longer the interaction occurs with the same cooperating individual, the higher the degree of cooperation which can be sustained.

Two remarks are in order concerning this result. First, note that ALLD is also evolutionary stable (since it is a strict Nash equilibrium). Thus, one might wonder about the evolu-

[5] Note that for the payoff matrix (1) the condition R=b-c>(S+T)/2=(b-c)/2 holds. This guarantees that if the game is played repeatedly, an agreement to alternate between cooperation and defection does not lead to a higher payoff than strict cooperation.

tionary mechanism to explain the evolution of cooperation the presence of two coexisting evolutionary stable equilibria. Axelrod and Hamilton (1981) refer to kinship and clustering as possible explanations. For example, a cluster of individuals using the TFT strategy can become viable (and cooperation can evolve) in an environment consisting of ALLD if the proportion of interactions within a cluster is sufficiently large. Second, the condition $w>c/b$ also emerges in the literature on repeated games, a class of games which has been used to address questions like the emergence of trust and corporate culture (see e.g. Kreps, 1990). In a repeated game setup fully rational players use trigger strategies to play the game, and cooperation is observed by the threat of punishment (see, e.g., Gibbons, 1992). Although interesting, this approach has been criticized on various accounts. The difference with regard to the approach taken in evolutionary game theory is that players are myopic and do not systematically try to influence the other player's future decisions (Friedman, 1991, 1998). The assumption here is that successful strategies spread in the population by being copied, imitated and learned, and therefore, although the results seem the same, the approaches differ substantially in their reflections of real-world behavior.

Indirect Reciprocity (or "I scratch your back and somebody else will scratch mine")

Cooperation enabled by the rule of Direct Reciprocity is based on repeated encounters between the *same* two players. If the probability of meeting again in the next round is sufficiently large, then cooperation is an evolutionary stable strategy. Social systems and markets do not exclusively rely on the repeated interactions between the *same* individuals, however. Reputation mechanisms make it possible for players not directly involved in any face-to-face transaction to assess other player's decision-making behavior by observing how these players have behaved in the interactions with other individuals in the population (Parkhe, 1993; Cowan et al., 2007; Hanaki et al., 2007). Therefore, if a "good" reputation leads other players to cooperate, it pays for an individual to invest in reputation, i.e., cooperate with a particular player, even if it is certain that the transaction with this player is only one-shot. Since players with a "bad" reputation can be punished by being exempt from further cooperation (they are not "trusted" anymore), an obvious link with moral norms in human societies emerges (Nowak and Sigmund, 2004). Moreover, there is an obvious link to the concept of structural embededdness, since this concept has been often connected to the notion of 'status' of actors in networks (Gulati, 1998; Cowan et al., 2007).

Although a formal treatment of the mechanism of indirect reciprocity is quite complicated and beyond the scope of this paper (see, in particular, Nowak and Sigmund, 1998a, b), a simplified version of the model can be presented to derive the mechanism under which cooperation can develop in a situation where indirect reciprocity plays a role. Let us consider the two strategies, defection and cooperation, and let q denote the probability of knowing the reputation of another player. For defectors the reputation of other players does not matter, they never help. On the other hand, cooperators only abstain from helping a player if this player's reputation indicates a defector. Therefore, a cooperator helps (i) another cooperator and (ii) a defector with probability *(1-q)*. This situation can be captured in the payoff matrix

$$\begin{array}{cc} & \begin{array}{cc} C & D \end{array} \\ \begin{array}{c} C \\ D \end{array} & \begin{pmatrix} b-c,\ b-c & (1-q)(-c),\ (1-q)b \\ (1-q)b,\ (1-q)(-c) & (0,\ 0) \end{pmatrix} \end{array} \tag{4}$$

and cooperation is an evolutionary stable strategy if the condition $q>c/b$ holds. In other words, if the probability of knowing the reputation of another player exceeds the cost-benefit ration, then cooperation prevails and can resist invasion by some other (mutant) strategy. Clearly, the probability q replaces the coefficient β in the core principle.

In the model presented above reputation is captured by a state which can be "good" or "bad", depending on the decision to cooperate or defect in the previous round. Panchanathan and Boyd (2003) use a different approach. In their paper, instead of focusing on the actions of others, they consider standing strategies which also require information about intent. That is, defection can be justified if the partner is in bad standing (i.e., this partner defected before with another partner). Such a justified defection has no effect on the individual's current standing. Panchanathan and Boyd (2003) demonstrate in their paper that in their model with standing based strategies cooperation can be evolutionary stable.

The role of cultural transmission in the evolution of cooperation

In the literature a variety of difficulties in using the above stated principles for explaining the evolution of cooperation have been discussed (for an overview, see Henrich and Henrich, 2006). Although *direct reciprocity* works well in small groups, it seems to work less well in larger groups. In noisy environments misunderstandings and misreadings of actions can lead to a reduction in the degree of cooperation. Furthermore, the success of a particular strategy in achieving cooperation through direct reciprocity depends heavily on the interaction environment, i.e. the strategies used by other individuals. The key to cooperation based on *indirect reciprocity* is the availability of reliable information on the reputation of another individual. As a result "[…] variables such as the size of the cooperative group [….], the population size […], the density of social connections between individuals in the population, and people's beliefs about gossip will strongly influence the effectiveness of indirect reciprocity." (Henrich and Henrich, 2006: p. 237).

The difficulties to explain large-scale cooperation in noisy environments among members of large groups with reference to direct and indirect reciprocity demonstrate that there is a need to complement these principles with some other mechanisms. In addition, the evolutionary mechanisms used so far in this paper mostly refer to genetic evolution. But the speed of change required by human society in general and the business sphere in particular is considerably higher than what can be realized by genetic evolution (Henrich and Henrich, 2006: p. 234). So it becomes necessary to integrate an evolutionary sub-mechanism that is able to bring about the needed change quickly. In this vein, we also need to explain the variety of different sorts of behavior and norms in different societies, groups and business organizations

(Henrich and Henrich, 2006). For both challenges one type of explanation is available: cultural capacities and cultural transmission mechanisms respectively. It is cultural capacities that vastly increase the potential for reciprocity by providing all sorts of learning devices. These cultural capacities help us "altering the social environment by building new forms of organization" (Henrich and Henrich, 2006: p. 235). In the following, we will turn to particular cultural transmission mechanisms that can explain the characteristics of business organizations.

One possible direction of argumentation has been pointed out by Mark Granovetter, who has outlined how social structure – e.g., the strength of personal ties – affects the quality of information flows and the ability to reward or punish interactants (Granovetter, 1985, 2005). More specifically, researchers in evolutionary (game) theory have recently demonstrated that *cultural transmission* mechanisms can support the evolution of cooperation, where culturally acquired strategies, beliefs, etc. are learned by observation and interaction within social groups.[6] In particular, on the basis of so-called "context biases", individuals select the features they want to copy (the behaviors, ideas, etc.) while being guided in their social learning by informative signals which are used to choose appropriate "role-models". The two most prominent manifestations of context biases are (1) the success and prestige bias and (2) the conformist bias. Success- and prestige-biased transmission works as a ranked-based copying bias, where individuals follow a tendency to copy strategies of more successful and better skilled people (Henrich and Gil-White, 2001). Conformist transmission entails a psychology to imitate high frequent – i.e., most common – patterns of behavior. This approach to adaptation is appealing when information about others is noisy and behavioral differences do not covary with success levels. Both approaches may lead to group homogenization and cooperation. On the one hand, high performing cooperative individuals could serve as role-models for others who imitate their respective traits (*success and prestige bias*). On the other hand, com-

[6] See Henrich (2003) and Henrich and Henrich (2006) for a review of the relevant literature. Economists also turned to this topic and generally understand culture as a set of shared beliefs, knowledge, and behavioral norms which influences preferences and decision making and substitutes for explicit communication (see, similarly, Besanko et al., 2000; Hermalin, 2000).

petitive pressures tend to sort out low-performing strategies, which could result in the dominance of cooperation within the population and in a tendency of copying remaining traits (*conformist transmission*).

Figure 1 summarizes our conceptual model and illustrates important steps of our analysis as well as the theoretical perspectives we take on. Starting from the evolutionary rules of direct reciprocity, indirect reciprocity, and kin selection, we argue that these rules are complemented by cultural sub-mechanisms in the short run. Enriched with insights from the theory of networks, we discuss and test determinants of network cooperation which are argued to affect direct and indirect reciprocity and their ability to promote the evolution of cooperation.

[Insert Figure 1 about here]

The Case of Franchising – Hypotheses development

The evolutionary models presented above incorporate dynamic processes of cooperative relationship development in a way that static agency and property rights theories are not capable of. To exemplify the relevancy of evolutionary arguments for the management of cooperative arrangements**,** we now use business-format franchising, one of the oldest and most successful inter-organizational forms, as the setting for our analysis. Franchising involves an upstream parent corporation, the franchisor, selling the right to market a product and/or service using a proven business format to local downstream firms, the franchisees.

For several reasons, franchising provides an attractive research environment to substantiate the basic tenants of this paper. First, it accounts for a major fraction of retail sales both in the U.S. and increasingly in other, especially European, countries (International Franchise Association, 2007). Understanding processes which promote cooperation is thus desirable for this organizational form. Second, the opportunities for cooperative activities, e.g., inter-firm knowledge exchange, are favorable within franchise chains. They develop naturally when the franchisor brings the participants of the network together, e.g., through experience meetings and system-wide training days. Third, on the franchisees' side, residual claimancy provides store owners with incentives to take advantage of collaborative activities within the network. Franchisors, in turn, benefit from positive externalities arising from cooperation between store owners. Subsequent enhancements of outlet performance might lead to higher royalties and strengthen the network as a whole. Finally, franchising is similar to other hybrids so that our insights should not only be of interest to scholars concerned with franchising but also to those studying inter-organizational relationships more generally.

Most importantly, franchising not only offers a clear example in which managers choose policies to secure collaborative efforts, but it also bears additional features which promote the application of evolutionary reasoning. As we will show below, not only direct and indirect reciprocity but also the mode of kin selection suite well as evolutionary rules for explaining cooperative behavior within franchise chains. We argue that, in franchising, evolutionary processes foster the proliferation of cooperation in two basic stages. In the first stage, the franchisor pursues one of his core duties in managing the chain, i.e., screening and matching agents with the ability to manage well and with a tendency to behave cooperatively (see, similarly, Minkler, 1992; Jambulingam and Nevin, 1999; and more general, Ireland et al., 2002). In the second stage, franchisees find together for interaction, while in the face of mutual appropriation hazards – in particular, free riding on joint efforts – cooperation is enhanced by the two fundamental mechanisms of direct and indirect reciprocity complemented by cultural transmission.

We will now explain in more detail how and under which circumstances this two-stage process promotes the emergence of inter-franchisee cooperation. Accompanied by the development of testable propositions, we will also outline some basic working conditions – determined by the firms' managers – that should influence the functionality of evolutionary rules for cooperation in securing cooperative behavior.

First Stage – Kin Selection on the Franchisor's Side

Franchise networks' success depends to a large degree on the systematic screening and matching of franchisees (Tatham et al., 1972; Justis and Judd, 1989; Ireland et al., 2002). By installing partner selection mechanisms, headquarters seek to set favorable conditions for local entrepreneurship and high-quality input provision. Typically, franchisors stipulate specific skills and personal characteristics required to successfully apply for a franchise, such as personality, experience in the industry, selling skills, etc. (Jambulingam and Nevin, 1999). Arguably, one central aim of this selection process is to ensure cooperative intent, i.e., the willingness to contribute to joint productions such as mutual learning and maintaining the brand name. As evolutionary scholars have found, a population of only cooperators has the highest fitness – a population of defectors has the lowest (e.g., Nowak, 2006b).

Franchisors should provide fertile conditions for the emergence of cooperation within their networks by structuring and homogenizing franchisee populations (Ireland et al., 2002, on managing alliances). Screening and matching franchisees on the basis of consistent criteria enhances partner similarity, e.g., in terms of cooperative intent, beliefs, and skills. As we have delineated above, evolutionary theory suggests that cooperation is more likely to prevail if cooperators are able to preferentially get in touch with other cooperators. In franchise systems, we expect a higher fraction of cooperation-oriented firms than in other network forms of organization due to the thorough screening processes which are commonly employed in franchising. As a result of matching efforts, one might metaphorically interpret a franchisee as being the franchisor's "offspring", i.e., being affiliated with the same chain could be regarded as a predictor of sharing similar beliefs or expectations about the value of cooperation. Building on these grounds, we infer that structuring franchisee populations by means of screening enhances franchise partners' degree of relatedness (again: metaphorically speaking) and similarity. In kin selection, the degree of relatedness, r, depicts the share of interactions with one's "relatives" who use the same strategy. We have shown in the previous section that cooperation can develop when the share of interactions among related individuals (cooperators meet cooperators) exceeds the cost-benefit ratio of cooperation: $r>c/b$. By homogenizing the franchisee population, headquarters contribute to raising the share of cooperators within the community (see figure 2). Thus, through screening, franchisors could set advantageous conditions for cooperation to prevail as an evolutionary stable strategy. Furthermore, by promoting a culture of cooperation and trust, cultural transmission mechanisms can support the evolution of cooperation among franchisees particularly well.

To summarize, our idea in taking up "kin selection" as a pathway to franchisee cooperation builds on the logic that franchisors structure and homogenize franchisee populations via selection procedures based on consistent matching criteria and thereby foster partner similarity (with respect to personal characteristics, such as entrepreneurial skills, and cooperative intent). Similarity, in turn, enhances the probability of personal interactions and, most importantly, the probability that cooperators get in touch with other cooperators.

[Insert Figure 2 about here]

> *Proposition 0:* In franchising, we expect to observe higher degrees of cooperation among the systems' partners than in other network forms of organization with less thorough screening processes. Screening and matching efforts should enhance the degree of relatedness, *r*, between the players involved and thereby promote the evolution of cooperation through kinship. Cultural transmission mechanisms are then more likely to support the proliferation of cooperation.

Second Stage – Inter-Franchisee Cooperation (Direct and Indirect Reciprocity)

Given the franchisor-determined structure of the franchisee population, store owners find together for task-oriented and social interaction, e.g., via training days and self-initiated meetings. Practitioners and scholars have often attributed the dominance of the retail and service sectors by franchises to cooperation-related benefits: sharing a well-reputed brand name, access to the chain's experience, and being part of a community of entrepreneurs capable of translating a business concept into action (e.g., Love, 1986; Kalnins and Mayer, 2004; Shane, 2005). Arguably, the core component of inter-franchisee cooperation refers to mutual learning, i.e., transferring knowledge from one firm to another as well as creating new knowledge through interaction (Larsson et al., 1998). In contrast to franchisors, who generally codify knowledge and distribute standardized routines (Bradach, 1998; Knott, 2003), store owners are more conceived as repositories for tacit knowledge, e.g., concerning consumer wants, that is idiosyncratic to local markets (Michael, 1996; Argote and Darr, 2001; Kalnins and Mayer, 2004). Exchanging such complex knowledge largely demands personal face-to-face cooperation – "[…] the *interorganizational learning* of alliances, not the vicarious learning of benchmarking […]" (Lane and Lubatkin, 1998: p. 463).

As Henrich and Henrich (2006: p. 224) have pointed out, the human's social learning capacities outreach all other species. The authors argue that selection processes favor social learning and, thus, cultural capacities for imitation and adaptation, if it is possible to take advantage of others' experience. For example, because of cognitive limitations and costs of information acquisition, individuals will often be better off if they connect with, listen to, and learn from successful people via social interaction. However, the core dilemma is that "being a cooperator" allows exploitation by firms who seek to maximize their appropriation of joint efforts through free-riding (Larsson et al., 1998; Henrich and Henrich, 2006). Individuals will then retain less resources for own growth and prosperity if they have a tendency to incur costs in order to help others. Given this dilemma, we have shown above that the evolutionary rules of direct and indirect reciprocity can secure cooperative behavior because they allow interactants to direct their favors preferentially to other cooperators.

In the following, we discuss three particular contingency variables – i.e., franchisee-related working conditions set by the franchise management – that should affect direct and indirect reciprocity's effectiveness in leveraging franchisee cooperation (see figure 1). These contingency variables are: (1) franchisee's network position, (2) franchisee's length of chain affiliation, and (3) local network (over-)size.

Network position. Direct reciprocity represents a pathway to cooperation since tit-for-tat increases the chances of channeling benefits only to cooperators. Here, cooperation can be secured if the probability, w, of another encounter between the same individuals exceeds the cooperation's cost-benefit ratio: $w>c/b$. Under indirect reciprocity, individuals may interact seldom or occasionally, but they collect information about their potential partners' former behavior in relationships with third party interactants. Indirect reciprocity fosters cooperation if the probability, q, of knowing another player's reputation exceeds the cost-benefit ratio of cooperation: $q>c/b$. Cultural learning capacities are an important basis for reciprocal mechanisms of cooperation as cooperators have to evaluate, store, and remember information about others' past behavior (Henrich and Henrich, 2006).

If franchisees occupy central network positions, i.e., if they are situated in locations with a relatively high number of store owners in the neighborhood, they should face fertile conditions for inter-partner collaboration, especially in terms of mutual knowledge transfer (see, similarly, Powell et al., 1996; Gulati, 1998; Tsai, 2004; Hanaki et al., 2007). Store owners being co-located exhibit manifold and less costly opportunities for frequent interactions, e.g., personal visits of other store owners can be realized with less effort of time. Managers of nearby franchises are thus more likely to repeatedly meet face-to-face than those separated by greater distance, leading to a higher probability, w, of another encounter. Equally, the probability, q, that a cooperating franchisee knows the reputation of another store owner should increase in case of proximity since it will be easier for co-located franchisees to remember, observe, and validate behavioral information – a firm's reputational capital should be more accurately noticed by nearby partners due to high degrees of visibility. Co-located franchisees should thus be better able to enhance the degree of bestowing benefits only on cooperators.

Substantiating this assertion in the context of the prisoner's dilemma, researchers have argued that cooperation is more likely to emerge when it is easy to observe and to obtain information about others' strategies (Abreu et al., 1991; Cable and Shane, 1997).

In light of indirect reciprocity, being proactively helpful to others – even without directly receiving any benefits in return – may be a reasonable strategy because being generous and "making a show of it" contributes to reputation building via costly signaling (Henrich and Henrich, 2006: p. 238). Henrich and Henrich (2006) have pointed out that such cooperative "broadcast acts", e.g., getting involved in a franchisee council, will be more promising if many members of the broadcasting unit's social network are present. Apparently, cooperative efforts are more visible in the close neighborhood of a franchisee, where the probability of meeting again is higher. Thus, the costs of broadcasting acts should spread more effectively if potential cooperators belong to the same geographical area; in this case, the probability of the signaling unit to be (locally) known as a cooperator should increase more strongly.

> *Proposition 1:* Franchisees tend to cooperate more with others if they occupy locations with a relatively high number of owners in their close neighborhood. Co-located store owners should display both a higher probability, w, of meeting again, and a higher probability, q, of knowing the reputation of another player. Cultural transmission mechanisms are then more likely to support the proliferation of cooperation.

Relationship duration. Another important contingency factor which could determine the effectiveness of direct and indirect reciprocity in promoting cooperative behavior is length of network membership. Direct and indirect reciprocity crucially depend on interaction experience and memory. Arguably, relationship duration can be interpreted as an indicator for the breadth of past interactions with other members of the chain, e.g., via general seminars, and might thus resemble franchisees' amount of experience working together. Experience working together, in turn, deepens the knowledge of other members' intentions and capabilities, which may aid to reliably identify appropriate partners (see, similarly, Borgatti and Cross, 2003; Reagans et al., 2005; Zollo et al., 2005). More experienced franchisees – with long-term affiliations to their network – should thus be more likely to have access to the relevant knowledge about others' past interactions and attitudes towards cooperation. In other words: the interaction experience gathered over time should enhance the probability, q, of knowing the reputation of another franchise partner, which contributes to satisfying the condition $q>c/b$ for indirect reciprocity to secure cooperation.

In addition, firms ought to develop more fine-grained capabilities for interacting and information processing over time such that experience in collaborating provides a promising source for further cooperative activities (Cohen and Levinthal, 1990; Powell et al., 1996; Simonin, 1997; Ingram and Baum, 2001). Building on these grounds, we infer that franchisees with long-term network affiliations are more likely to be commonly identified as cooperators (or defectors) since their past behavior is more apparent.[7] If past behavior suggests that an individual is a cooperator, selection pressures should favor those who bestow benefits on that person, especially due to expected return flows of benefits (see, in more detail, Henrich and Henrich, 2006). Furthermore, and with a focus on direct reciprocity, length of network membership might also be conceived as an indicator for a franchisee's tendency to further remain in the network. Relationship length has been argued to positively influence expectations about the continuity of the exchange in the future (Dant and Nasr, 1998). For more experienced franchisees, the expected probability, w, of another encounter should thus be relatively high, which would contribute to satisfy the condition $w>c/b$ for direct reciprocity to foster the evolution of cooperation. For direct reciprocity to work, the probability of another round of interaction has to exceed the cooperation's cost-benefit ratio. As Henrich and Henrich (2006: p.

[7] For example, from the perspective of the franchisor, the age of a relationship could be interpreted as an indicator for past agent behavior, namely whether decision leeway has been utilized constructively (see, generally, Eisenhardt, 1989: p. 62).

233) have argued: "[…] being NICE should depend on cues about how long interactions might go on […]."[8]

> *Proposition 2:* Franchisees tend to cooperate more with others as length of network membership increases. Long-term affiliations to franchise chains should both enhance the probability, w, of meeting again, and the probability, q, of knowing the reputation of another player. Cultural transmission mechanisms are then more likely to support the proliferation of cooperation.

Local network (over-)size. We have argued above that franchisees face fertile conditions for inter-partner cooperation if they occupy locations with a relatively high number of other store owners located in their neighborhood. However, the beneficial effects of holding central network positions might be offset by countervailing effects of *oversized* network communities. Franchisees sometimes complain of a phenomenon termed "territorial encroachment", i.e., franchisors may add *too many* units proximately to franchisees' existing outlets, which could lead to more intense intra-chain competition (Kaufmann and Rangan, 1990; Sheridan and Gillespie, 1995; Kalnins, 2004).[9] In case of exclusive territory clauses being absent or not set in a competition-attenuating fashion, defective behavior, e.g., mutual withholdings of information, appears as a likely consequence of oversized communities. Shane (2001) put forward further arguments for agency hazards to exacerbate with increasing networks. In particular, monitoring becomes more difficult when networks grow, and since the value of a chain's brand name gets higher with the number of related outlets (Lafontaine 1992), the free-riding problem is more severe for larger systems than for smaller ones. In consequence, both the ability to bestow benefits preferentially on cooperators and the probability of knowing one's cooperative intention would decline in case of network size being too large.

[8] Basically, reciprocal strategies enabling long-term cooperation are NICE, which means that, in general, successful strategies cooperate at the beginning of an interaction without suspicion (Henrich and Henrich, 2006: p. 233).
[9] The threat of territorial encroachment stems from the conflict that franchisees maximize store profits, but franchisors tend to maximize the chain's sales since they usually receive a royalty based on franchisee revenue.

Not only from the viewpoint of intra-chain competition can we expect deteriorating effects of network oversize on cooperation. Observing and remembering others' behavior become more complex tasks as local communities increase, e.g., limited informational capacities impose boundaries for handling large networks. Relatedly, it will be harder for a franchisee to build up and memorize transaction histories with an oversized number of units since the probability of meeting again in repeated encounters, *w*, might decline with a greater community of interactants. Gathering information about potential partners' behavior would be harder to realize in this situation so that the probability of knowing another player's reputation, *q*, could decrease as well. For indirect reciprocity to work, reliable reputational information is needed (Henrich and Henrich, 2006). Yet, in case of local network size being extraordinary large, there is a higher risk of receiving inaccurate and ambiguous information about what potential partners did in the past, which makes reciprocal strategies more difficult to pursue. In line with these arguments, Henrich (2003: p. 11) concludes: "The amount of cooperation supported by indirect reciprocity declines exponentionally with increasing group size […]." Accordingly, scholars have shown that indirect reciprocity favors cooperation when populations are relatively small and individuals tend to interact repeatedly (e.g., Boyd and Richerson, 1989; Nowak and Sigmund, 1998a; Henrich, 2003).

> *Proposition 3:* Franchisees tend to cooperate less with others as they perceive their local network as being oversized. Network oversize should both decrease the probability, *w*, of meeting again, and the probability, *q*, of knowing the reputation of another player. Cultural transmission mechanisms are then less likely to support the proliferation of cooperation.

A Preliminary Empirical Test

Sample

By conducting an empirical test within a single franchise chain, we seek to give first insights into the viability of our propositions 1 to 3, which refer to conditions affecting the functionality of the evolutionary modes of direct and indirect reciprocity. For these purposes, we used cross-sectional data collected from a sample of franchisees operating in a large German franchise chain (with about 485 franchise units) from the travel industry. The data were gathered through mail surveys and for purposes of a broader research project on franchisee satisfaction (see Schlüter, 2001) during the year 2003. A self-administered questionnaire was sent to the focal chain's franchised outlets. The franchisor provided the postal addresses of the partners.

The selection of the Likert-type questionnaire items partly emerged from a qualitative-explorative pre-study involving franchisors, consultants, and franchisee focus groups. A total of four moderated focus groups gathered 15 franchisees from eight different chains. In the framework of these meetings, probands were given the opportunity to express important facets of their business relationships and franchisee satisfaction as well. Despite collaboration with the focal system's head office in conducting the survey, participation remained voluntary. The survey yielded a sample of 168 observations.

Dependent variable

The dependent variable in our study was franchisee cooperation which we operationalized using items directly related to inter-franchisee exchange. In the questionnaire, we asked store owners to rate their contribution and inclusion to cooperative activities in three ways, each tapping core aspects of the partners' face-to-face interaction: (1) "I exchange views on business issues with other franchisees on a regular basis", (2) "Actually, I only meet other franchisees on system-wide meetings and events" (reverse-coded), and (3) "In case of any questions, I can contact other franchisees anytime".[10] The Likert-type items grasped the respondent's degree of confirmation to each statement on a 7-point scale ranging from "strongly disagree" to "strongly agree". Reliability of the scale was assessed by Cronbach's alpha. The alpha value of 0.66 was above the lower limit of acceptability, set at 0.60 for newly developed scales (Hair et al., 1998). Results of a principal component factor analysis revealed that the three dimensions were part of a higher order construct. All items loaded on one factor (factor loadings ≥ 0.62), suggesting that they were associated with each other. A composite measure was built by summing and averaging – using equal weights – the scores of the items.

Independent Variables

Network position. To measure centrality of franchisee's network position, we first calculated the distances between each of the chain's stores. In the questionnaire, respondents were asked to specify the first two digits of their postal code (158 owners did so). Although information about the full postal code, comprising five digits, would have added precision to the calculations, only two digits were requested in order to guarantee anonymity.[11] To calculate distance, a standard route planning software was used, introducing a franchisee's two-digit postal code as the starting point and the two-digit postal code of the potential partner as the destination. In a second step, we specified a geographical boundary up to which store owners can be considered as nearby neighbors. We chose a distance of 50 kilometres (approximately 31 miles) as a reasonable proxy to tap spatial closeness. To concretize whether a franchisee occupies a central network position, we counted the number of store owners being co-located within the radius of 50 kilometers. Note that with higher distances as proxies for closeness, the relationship between network position and franchisee cooperation weakened.

[10] Note that all items have been translated from German to English.
[11] A two-digit postal code covers a surface of approximately 6,000 square kilometres. There are 99 different two-digit postal codes in Germany.

Relationship duration. Franchisees were asked to indicate the year in which they joined the network, from which relationship length with the company (in years) was calculated.

Network (over-)size. Using a 7-point Likert-type scale ("strongly disagree" to "strongly agree"), franchisees were asked to rate their degree of confirmation to the following statement: "The number of partners has meanwhile exceeded a reasonable limit". This evaluation indicated whether franchisees perceived their community as being oversized; network oversize, in turn, implies more intense intra-brand competition and high coordination costs.

Control Variables

To strengthen the analysis, variables were controlled which may, in addition to the independent variables, influence the intensity of franchisees' cooperation efforts.

Opportunism of other franchisees. Using a 7-point scale ("strongly disagree" to "strongly agree"), franchisees were asked to rate their degree of confirmation to the following statement: "Each franchisee is primarily concerned about his own advantage". Franchisees who feel that others primarily follow selfish goals are less likely to expect mutuality in collaborative activities and should thus spend fewer resources on cooperation.

Other franchisee-related working conditions. We additionally incorporated the following three controls as aspects of store owners' working environment: (1) the number of franchisee's outlets, (2) the number of franchisee's employees, and (3) working hours per week. In franchising, multi-unit ownership describes a situation where one entrepreneur owns more than one outlet. Darr et al. (1995) found knowledge to transfer across stores owned by the same franchisee but not across stores owned by different franchisees; in this vein, the demand for cooperation-related benefits might be weaker for multi-unit owners. A similar reasoning could apply with regards to the size of franchisee's business activities, as measured by the number of employees. With larger firm size, better resource equipment, and a higher potential for realizing scale economies, store owners could be less dependent on cooperation benefits.

Franchisees were asked to indicate the number of employees using a 5-point scale.[12] Finally, we asked store owners to specify their working hours per week. The higher the amount of working hours per week, the higher the opportunity costs of spending resources on cooperative efforts might be.

Table 1 displays the descriptive statistics and correlations for each of the variables. The average franchisee perceived his cooperation activity level slightly above a moderate extent (mean = 4.21; s.d. = 1.24). Most notably, significant correlations to the franchisee cooperation scale emerged for network position, relationship duration, the perception of an oversized network, and opportunism of other franchisees.

[Insert Table 1 about here]

Regression Results

As a final step of our preliminary empirical test, we regressed franchisee cooperation on the independent variables by employing ordinary least squares regression. Note that, within our cross-sectional setting, we have not assessed how the independent variables directly affect the evolutionary rules of direct and indirect reciprocity. Thus, our results are intended to give only first insights into the viability of our propositions. For reliability reasons, variance inflation factors were investigated to test for multicollinearity among the explanatory variables. All values lay well below the usual threshold of 10 (the maximum observed was 1.186), beyond which problems of multicollinearity can be considered severe (Hair et al., 1998). Further tests indicated that the assumptions of normally distributed random errors and homoscedasticity were met. The results from the OLS model are displayed in Table 2.

[Insert Table 2 about here]

In the regression model, network position ($b = 0.066$, $p < 0.05$), relationship duration ($b = 0.047$, $p < 0.10$), and opportunism of other franchisees ($b = -0.180$, $p < 0.01$) came out sig-

[12] The scale was constructed as follows: less than three employees = 1; three to four employees = 2; five to six employees = 3; seven to eight employees = 4; more than eight employees = 5.

nificant. The positive coefficients of the network position scale and relationship duration indicated general support of *Propositions 1 and 2*. These propositions suggested that franchisees face favorable conditions for direct and indirect reciprocity to secure cooperation if they display a relatively high number of co-located owners and hold long-term affiliations to their network. However, since the coefficient of the network (over-)size variable was not significant – event though the corresponding scale showed a significant negative correlation with franchisee cooperation –, we found no support for *Proposition 3*. Within this proposition, we argued that the conditions for direct and indirect reciprocity would be less advantageous if franchisees evaluated their network as being too large. To gain further insights into the operation of the network-oversize variable, we grouped the chain's franchisees into two ordered categories and then conducted Mann-Whitney-U tests. Most interestingly, franchisees who did not evaluate their network as being oversized, displayed significantly higher relationship durations, lower levels of perceived opportunism, and higher values of the cooperation scale (see Table 3). Even though OLS regression could not confirm a negative effect of the oversize variable on franchisee cooperation, these further tests at least hinted to the eligibility of recognizing network size effects when analyzing cooperation levels.

[Insert Table 3 about here]

Summary and Discussion

A challenge to management research is to explain the emergence and evolution of cooperation in alliances and networks. In this paper we attempted to use insights from evolutionary (game) theory and cultural and social learning in order to shed light on this topic. We elaborated on a conceptual model and provided conditions and cooperative mechanisms that enable the dynamic proliferation of cooperative strategies in economic settings. In particular, we introduced three evolutionary principles, kin selection, direct reciprocity, and indirect reciprocity, and demonstrated how these mechanisms can bring about cooperation. We argued that these principles are complemented by cultural transmission mechanisms, e.g. prestige-biased and conformist transmission, which describe how cultural learning supports the evolution of cooperation.

We have then applied our conceptual model to the case of franchising, which suites well for giving a flavor of how to incorporate evolutionary theory into the analysis of collaborations. In the first stage, the franchisor pursues one of his managerial core duties: screening and matching agents, whereby franchisees' degree of relatedness is enhanced (kin selection). In the second stage, franchisees find together for interaction, while cooperation is fostered by the mechanisms of direct and indirect reciprocity. We discussed three contingency variables, (1) franchisee's network position, (2) length of chain affiliation, and (3) network (over-)size, which may determine the effectiveness of direct and indirect reciprocity.

Finally, we provided preliminary evidence using a sample of 168 German franchisees. The results show that store owners tend to engage more in cooperative activities if they occupy locations with a relatively high number of owners in their neighborhood, and franchisees cooperate more with others as length of network membership increases. The results confirmed our propositions 1 and 2. Yet, we could not confirm the proposition that franchisees tend to cooperate less as they perceive their local network as being oversized (one explanation for this null-finding might be that exclusive territory assignments attenuate competition within the focal chain).

In our paper we considered recent results in evolutionary (game) theory and we proposed culture, i.e. fast operating cultural transmission mechanisms, as a link between evolutionary theory and a managerial perspective on collaborations. Future research should further clarify both the importance and the attractiveness of integrating evolutionary theory into the analysis of inter-firm cooperation in real-life settings. With regards to our empirical study, we would welcome more fine-grained tests of our propositions. In particular, one may analyze cooperation longitudinally and compare different populations of firms while assessing whether networks or groups vary with respect to cooperation levels. Possible differences in cooperation activities might be explained by more or less favorable conditions for kinship, direct reciprocity, and indirect reciprocity to promote cooperative behavior. Future studies may also continue by measuring constructs such as partner relatedness as well as the actual use of reciprocal strategies in order to more directly relate network partners' working conditions to the functionality of evolutionary rules of cooperation. In doing so researchers could deepen our understanding of the relation between the fields of evolutionary (game) theory and cultural anthropology and strategic management, with its subfields. We believe that bringing together these different approaches is fruitful, since rigorous models from evolutionary theory help to develop testable hypotheses in strategy research. We conclude with a preliminary remark on the managerial implication. The approaches brought together here lead to a new perspective on the role of alliance and network management: We submit that cultural transmission mechanisms, with success or prestige and conformist biases, make comparatively high levels of conformity a prerequisite for success.

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Figures and Tables

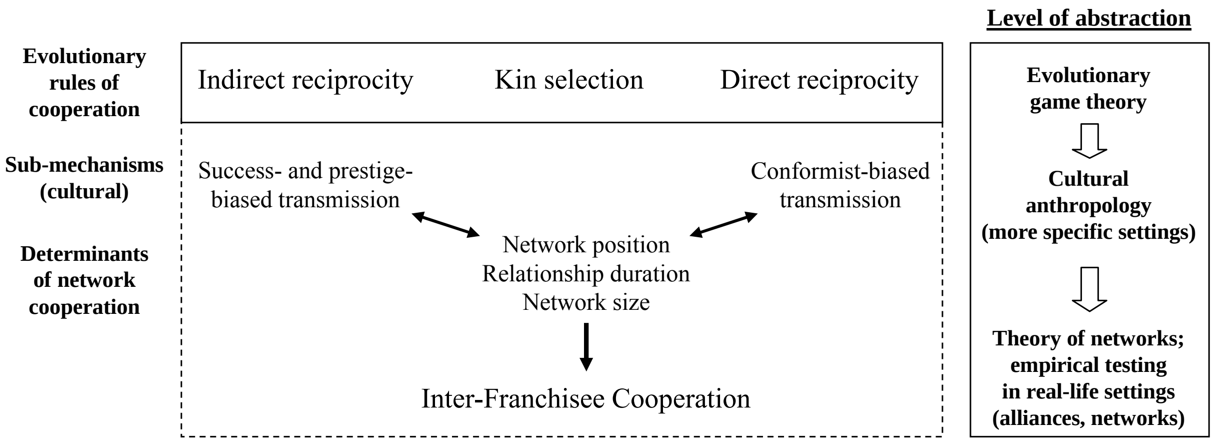

Figure 1. Agenda and Overview

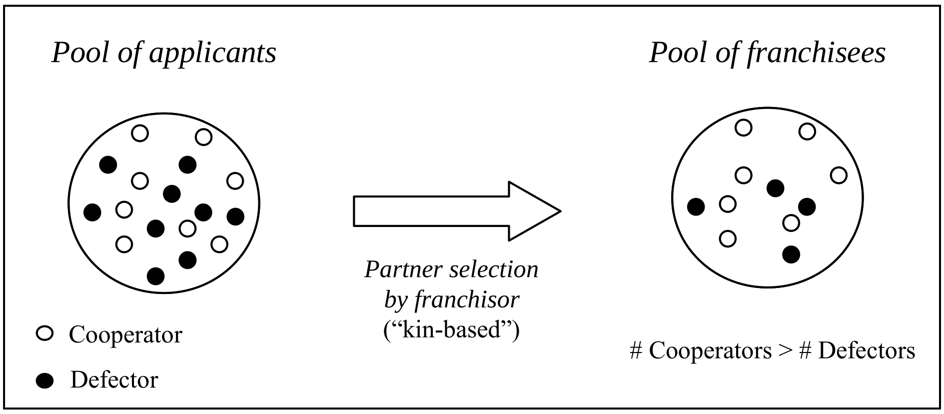

Figure 2. Franchisee Selection and Degree of Relatedness

	mean	s.e.	1.	2.	3.	4.	5.	6.	7.
1. franchisee cooperation	4.21	1.24							
2. # franchisee's outlets	1.42	1.24	-0.01						
3. # franchisee's employees	2.04	1.17	-0.07	0.35***					
4. working hours per week	51.39	11.97	-0.00	0.04	-0.08				
5. opportunism of other franchisees	5.32	1.66	-0.32***	0.07	0.10	0.07			
6. network position	4.52	3.75	0.15†	0.12	-0.01	-0.05	0.04		
7. relationship duration	5.52	4.20	0.18*	0.11	0.13	-0.15†	-0.17*	-0.13	
8. network (over-)size	3.48	2.01	-0.18*	-0.03	-0.04	0.20*	0.21*	0.13	-0.08

n varies between 140 and 158; significance levels: *** $p < 0.001$; * $p < 0.05$; † $p < 0.10$. s.e. = standard error.

Table 1. Descriptive Statistics

	Dependent variable: franchisee cooperation
# franchisee's outlets	-0.016 (0.082)
# franchisee's employees	-0.071 (0.092)
working hours per week	0.005 (0.009)
opportunism of other franchisees	-0.180** (0.064)
network position	0.066* (0.028)
relationship duration	0.047† (0.025)
network (over-)size	-0.068 (0.053)
n	130
F	2.983**
R^2	0.145
Adjusted R^2	0.096

Significance levels: ** $p < 0.01$; * $p < 0.05$; † $p < 0.10$. Standard errors in parentheses.

Table 2. Regression Results

Grouping variable: network (over-)size*	relationship duration	opportunism of other franchisees	franchisee cooperation
Mann-Whitney-U	1963.00	2207.00	2207.00
Wilcoxon-W	4378.00	5057.00	4835.00
Z	-2.043	-1.709	-2.037
p	0.041	0.087	0.042
n	140	145	148
Mean: group 0	5.831	5.133	4.417
Mean: group 1	5.203	5.557	4.009

* Values from 0 to 3 = 0 ("no"), values from 4 to 7 = 1 ("yes"); mean: 0.483, s.e.: 0.501.

Grouping variable: network (over-)size*	relationship duration	opportunism of other franchisees	franchisee cooperation
Mann-Whitney-U	1533.000	1624.500	1747.000
Wilcoxon-W	2436.000	6775.500	2782.000
Z	-2.405	-2.655	-2.387
p	0.016	0.008	0.017
n	140	145	148
mean group 0	6.071	5.139	4.388
mean group 1	4.238	5.796	3.830

* Values from 0 to 4 = 0 ("no"), values from 5 to 7 = 1 ("yes"); mean: 0.305, s.e.: 0.462.

Table 3. Mann-Whitney-U Tests.