# Effects of Evolutionary Rules on Cooperative Tendencies in Franchising Networks

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**ABSTRACT**

We develop a conceptual framework that integrates concepts from evolutionary (game) theory and from cultural anthropology to study how cooperation emerges and persists within organizational contexts. In particular, we argue the case for three rules that govern the evolution of cooperation – kinship selection, direct reciprocity, and indirect reciprocity. We apply these rules to a cooperative arrangement that displays particularly interesting features as regards its entrepreneurial members' tendencies towards choosing cooperative vs. defective, or "free-riding", behavior: to the franchise form of organization. We further argue that social learning and cultural transmission mechanisms support these three rules of cooperation, so that cooperation can evolve and remain stable even in noisy and large group environments. The model helps organizations understand factors that affect cooperative tendencies among its network members, and provides direction on how to foster, promote, and fine-tune a cooperative climate in the network – initially, as well as in the long run. Accordingly, we develop specific propositions concerning the evolution of inter-firm cooperation within the franchised type of business.

# INTRODUCTION

*"Being NICE should depend on cues about how long interactions might go on"*
(Henrich, and Henrich 2006)

Following the widespread belief that interfirm networks can provide efficiency advantages that markets or hierarchies do not possess, management and entrepreneurship scholars have offered evidence that network relationships play a fundamental role in shaping a firm's competitive advantage in the marketplace (Afuah, 2000; Lavie, 2006; Lee, Lee, & Pennings, 2001; Stuart, 2000). Both streams of research have studied the prevalence and effects of inter-firm cooperation through various theoretical lenses, including resource-based arguments, transaction cost economics and agency settings, as well as sociology-based constructs like social capital and trust formation (for example, Chen & Tan, 2009; Gulati, 1998; Ireland, Hitt, & Vaidyanath, 2002; Uzzi, 1997). Recently however, scholars have raised substantial criticism on how research on interfirm collaboration is currently conducted. Among others, Slotte-Kock and Coviello (2010) argue that more valuable insights could be produced if multiple theoretical perspectives were applied to the analysis of network processes, and express severe concerns with the lack of theoretical and practical "richness" resulting from a dearth of "teleological, dialectic, or evolutionary theory" in network literature.

Recent work (e.g., Burt, 2000; Hite & Hesterly, 2001; Kim, Oh, & Swaminathan, 2006; Koka, Madhavan, & Prescott, 2006; Slotte-Kock, & Coviello, 2010) stresses that for conducting meaningful research on organizational networks, studies must be grounded in the fact that networks evolve dynamically, and do so in a variety of ways: individual entrepreneurs, as well as networks at large, frequently re-specify goals, constantly interact with diverse environments, create tie variation, and influence tie selection and retention over time. Thereby, individuals' ongoing varia-

tion, selection, and retention of ties, and their environmental alignment, are vital for explaining the evolution of entire networks. This claim is consistent with previous calls, for example Parkhe, Wasserman, and Ralston (2006) highlighting the need to focus on process issues by placing network research temporally in its broader context, or Hite (2005) describing an unfortunate "lack of evolution and presence of de-evolution" in the entrepreneurship literature.

Thus, the field of entrepreneurship – although having a long tradition in postulating the importance of collaboration for gaining competitive advantage, and in emphasizing the functionality of networks for managing resource dependencies and fostering learning and knowledge exchange (Aarstand, Haugland, & Greve, 2009; Chen & Tan, 2009; Dyer & Singh, 1998; Greve & Salaff, 2003; Gulati, 2000; Karra, Tracey, & Phillips, 2006; Lavie, 2006; Lee et al., 2001; Zollo, Reuer, & Singh, 2005) – has up to now missed a promising opportunity: to generate valuable insights by incorporating ideas from *evolutionary theory*, particularly, as it relates to *game theory*, into the analysis of inter-firm cooperation. Besides, contributions so far often lack an enhanced presentation of arguments via rigorous mathematical models. Thus, the preconditions and the mechanisms underlying cooperative behavior in inter-firm relationships (the "rules of the game"), that is, the foundations of *dynamic evolution and proliferation* of cooperation, still remain unclear. Accordingly, drawing on a simple cost-benefit framework, we show that evolutionary theories can provide insight into the parameters that govern the emergence of inter-firm cooperation.

So far, few studies contribute to bridging the aforementioned gap. For example, Parkhe (1993), Cable and Shane (1997), and more recently, Arend and Seale (2005) and Hanaki, Peterhansl, Dodds, and Watts (2007), employ an iterated prisoners' dilemma to understand alliance activity and the development of cooperation. The prisoner's framework has been used by entrepreneurship scholars to capture the essence of social dilemmas and describe cooperation deci-

sions of firms (Axelrod, 1984; Cohen, Riolo, & Axelrod, 2001; Das & Teng, 2000; Mark, 2002; Simon, 1990). In contrast, we advance a broader logic that can incorporate insights from evolutionary theory and cultural learning to explain the emergence and stability of inter-firm alliances.

Research in evolutionary theory and cultural learning has also tried define how to establish and sustain cooperation in social dilemma situations (for example, Fehr, Fischbacher, and Gächter, 2002; Gintis, Smith, & Bowles, 2001; Henrich, 2004; Henrich & Henrich, 2006; Mark, 2002; Nowak, 2006b). We suggest that this strand of literature is useful not only for sociologists, but for entrepreneurship scholars, because it does not only identify evolutionary mechanisms that offer solutions to predicaments in cooperation, but it also provides an explicit calculus for cooperation processes based on a rigorous cost-benefit analysis. In addition, recent work in the field of cultural evolution (for example, Cohen et al., 2001; Cordes, Richerson, McElreath, & Strimling, 2008; Guzmán, Rodríguez-Sickert, & Rowthorn, 2007; Henrich 2004; Henrich & Henrich, 2006) complements such insights by showing that cultural transmission mechanisms serve as a link between evolutionary reasoning and managerial perspectives on collaborations.

Thus, to further our understanding of the emergence of cooperative behavior in franchise and other networks, we combine two essential theories of different levels of abstraction – evolutionary (game) theory and cultural anthropology. In particular, we establish their applicability to real-life economic phenomena such as (non)cooperation in networks. Thereby, we aim at offering a novel framework for approaching the question of how to anticipate, promote, and fine-tune the evolution of cooperation in an entrepreneurial context. Our contribution to the literature is three-fold. First, we integrate insights on the evolution of cooperation in dilemma situations and evolutionary principles, and present critical parameters that determine the (non)emergence of cooperation. Second, we apply these principles to entrepreneurial networks and identify cost and benefit

drivers that are particularly influential in inter-firm alliances. Third, we formulate testable propositions concerning the effects of these determinants on the emergence of cooperation over time.

The paper is structured as follows. In the next section, we explain the franchise type of business and argue why this organizational form is particularly apt for evolutionary reasoning. We then describe circumstances under which cooperative behavior can develop and present three evolutionary principles of cooperation: kinship selection, direct reciprocity, and indirect reciprocity. We enrich these principles by incorporating elements from recent work on social learning and cultural transmission mechanisms, like prestige-biased and conformist behavior. Throughout the paper, we develop propositions on parameters that affect the emergence and dynamics of cooperation and the functionality of evolutionary rules in securing inter-franchisee collaboration. We conclude by summarizing our arguments and by highlighting fruitful avenues for further research.

## COOPERATION IN ENTREPRENEURIAL NETWORKS: THE CASE OF FRANCHISING

The models presented in this paper are based on previous calls and reasoning in the literature towards a dynamic process view of cooperative developments. To study the relevance of evolutionary processes for cooperative arrangements, we focus on the context of business-format franchising, one of the oldest and most successful inter-organizational forms. In essence, "franchising" has become well-known as an arrangement midway between a price-determined market exchange and vertically integrated firm activities. The business concept involves a parent corporation, the franchisor, selling the right to market a product and/or service using a proven business format to local firms, the franchisees.

There are at least four reasons why franchising provides an attractive research environment to discuss the principles advanced in our paper. First, franchising accounts for a major share of retail sales, in the U.S. and in very many other, especially European, countries (Dant, 2008; Dant, Perrigot, & Cliquet, 2008; International Franchise Association, 2007). A better understanding of the processes that enhance or hinder worthwhile cooperation – and its evolution in particular, as franchising is based on long-term contracts and franchisees tend to "stick around" for a longer term – in this organizational form is desirable for both academics and practitioners. Second, as outlined in the literature, network partners play a significant role in shaping the resource-based competitive advantage of the firm (Afuah, 2000; Lavie, 2006; Lee et al., 2001; Stuart, 2000). Network relationships can offer privileged access to resources like information and best practice*s* that help individuals become more productive (Contractor, Wassermann, & Faust, 2006; Uzzi, 1997; Zaheer & Bell, 2005). Arguably, the most valuable component of cooperation lies in *mutual learning*, that is, in transferring knowledge from one firm to another and creating new knowledge in the course of interaction (Larsson, Bengtsson, Henriksson, & Sparks, 1998). In contrast to franchisors, who codify knowledge and distribute standardized routines (Bradach, 1998; Knott, 2003), franchisees are repositories for tacit knowledge (for example, on local consumer needs and motivations) that is idiosyncratic to local markets, and exchanging such knowledge needs face-to-face interaction – "the interorganizational learning of alliances, not the vicarious learning of bench-marking" (Lane & Lubatkin, 1998; see also, Argote & Darr, 2001; Grünhagen & Mittelstaedt, 2005; Kalnins & Mayer, 2004; Michael, 1996). Opportunities for such cooperative activities, for example, inter-firm knowledge exchange, are favorable in franchise chains, as relationships develop naturally when franchisees come together through meetings and training days, which many franchisors offer on a regular basis. Third, cooperation is "more needed" in franchising than in "normal" firms. The issue is that in franchising, externalities occur. Since there is a

common brand, and the brand value depends on the efforts of the franchisor as well as all the individual franchisees, each franchisee's profits depend also on decisions made by others in the chain. The interdependence on the common brand can be an asset, but also a liability, and is a central part of what franchisees buy into when joining a chain (Grünhagen & Dorsch, 2003). The more valuable the brand is, the higher the potential benefits to franchisees belonging to the system. Yet simultaneously, franchisees may also get more tempted to profit from free-riding on the well-known "good name" (this situation shares features of a family structure). Thus, franchisees' tendencies to free-ride are the downside of granting them high-powered incentives. Franchisors, in turn, benefit from positive externalities arising from interfranchisee cooperation, as enhanced outlet performance offers higher royalties and strengthens the entire network. In sum, franchisees are known for a tendency to free-ride on brand assets, yet at the same time their residual claimant status provides them with incentives to take advantage of collaborative action, making cooperative tendencies a very interesting subject to study in this context. Finally, franchising is still similar to other hybrid organizations in various aspects (for example, strategic orientations, common interest, expectation of gains, shared history, ongoing collective action), so that the approaches taken here should not only be of interest to scholars concerned with franchising but also to others studying interorganizational relationships.

Taken together, franchising is an economically important context where – based on their cost and benefit incentives – entrepreneurs can individually choose to display collaborative efforts, or not, which makes franchising all the more interesting for applying evolutionary reasoning. We expect that evolutionary processes affect the proliferation of cooperation in such networks in two stages. In the first stage, the franchisor pursues a core duty of chain management: screening and matching agents with the ability to manage their business and with a tendency to behave coopera-

tively (on franchisee selection, see Minkler, 1992; Jambulingam & Nevin 1999; Ireland et al., 2002). In the second stage, franchisees choose whether to engage in interaction. In the face of mutual appropriation hazards – in particular, free-riding on joint efforts – cooperation is enhanced by direct and indirect reciprocity, and these mechanisms are complemented by cultural transmission mechanisms. We argue that not only *kin selection*, but also the additional rules of *direct and indirect reciprocity*, apply to explaining cooperative franchisee behavior.

## AN EVOLUTIONARY APPROACH TOWARDS COOPERATION

As all networks tend to be "unstable" due to internal tensions and conflicting forces, understanding the main mechanisms that foster the evolution of cooperation is important for individual network members as well as for overall network management (Das & Teng, 2000; Ireland et al., 2002). Imagine that in a population of entrepreneurs in a franchise network, each individual has the option either to cooperate, that is render some service to another member firm (for example, share information, knowledge, or best practice), or to defect, that is provide no service. The recipient of this act receives a benefit of $b$. Helping someone along is costly, however (e.g., due to time investment). The cost to the donor is $c$. For cooperation to make sense, we assume that $c < b$. Next, we describe the payoffs occurring in an interaction between the two firms. If a cooperator meets another cooperator, both receive the benefit $b$, but they have to carry the cost $c$ for helping each other. Therefore, the payoff to both of them is $b - c$. If only one firm helps and the other does not, the defector receives the benefit without paying the cost, whereas the donor pays without receiving a benefit (that is $b$ for the defector and $–c$ for the donor). If both firms do not help, the payoff is 0 for both. Hence, the payoff matrix of an interaction between cooperators ($C$) and defectors ($D$) is

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

If this payoff matrix describes the decision-making environment of the network members, co-operation will not occur: Not knowing what the other firm does, it is always better for the focal firm to defect ("dominant strategy"). The Nash equilibrium predicts defection of both firms (re-ceiving a payoff of $0$). This payoff matrix can be understood as the prisoner's dilemma game by setting the reward ($R$) for mutual cooperation $R = b - c$, the temptation ($T$) to defect $T = b$, the loser'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 such a dilemma game (see for example, Axelrod & Hamilton, 1981; Nowak, 2006a). Hence, rational decision-making in firms will lead to the de-fection of both firms.

If we let natural selection work and consider how the ratio of cooperators and defectors evolves over time in a population of boundedly rational decision-makers, we obtain the same result: imagine a mixed population of cooperators and defectors. Let the frequency of cooperators in the population be $x$ and the frequency of defectors $1 - x$. 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 average payoff of a defector is $f_D(x) = bx$. Therefore, defectors dominate cooperators (in terms of fitness). If higher payoff strategies replace lower payoff strategies (within the bound-ed rationality assumption), the frequency of defectors will steadily increase until all cooperators are extinct. This can also be demonstrated by referring to the so-called "replicator dynamics". Replicator dynamics holds that if a strategy earns an above-average payoff, then its share in the population increases, whereas otherwise it decreases. Formally, $\dot{x} = x[f_C(x) - \bar{f}]$, where $\dot{x}$ rep-

resents the change in the share of cooperators and $\bar{f} = xf_C + (1 - x)f_D = (b - c)x$ is the average payoff in the population (for example, Weibull, 1995). Substitution easily shows that the percentage of cooperators will decline steadily. In other words, defection is an evolutionary stable strategy and thus, a population of defectors cannot be invaded by a (small) group of cooperators.

Since cooperation cannot develop in a situation represented by the payoff matrix (#1), further mechanisms are required. Evolutionary theories of cooperation provide a simple principle for the emergence of cooperation: Cooperation can evolve when circumstances are such that cooperators tend to cooperate with other cooperators (Cohen et al., 2001; Henrich & Henrich, 2006; Nowak, 2006b). Formally, this can be expressed by the condition $\beta b > c$, where the coefficient *beta* measures the degree to which "being a cooperator" predicts "bestowing benefits on other cooperators" (see Henrich, 2004; Henrich & Henrich, 2006), and *b* and *c* represent the benefits and the costs of cooperation. Thus, in the simplest case, *beta* can be interpreted as the probability of bestowing benefits on another cooperator. However, in the remainder of this section we will present three different evolutionary principles (or "rules"), kin selection, direct reciprocity, and indirect reciprocity, and accordingly, interpret the coefficient either as

- the share of interactions among "related" (that is "similar") member firms (*kin selection*),

- the probability that interaction with another member firm will continue to the next round (*direct reciprocity*), or

- the probability of knowing the reputation of another member firm (*indirect reciprocity*).

These three principles show how, based on cost and benefit considerations, cooperation can evolve and ultimately dominate in a population of boundedly rational firms in a network. Building on work in evolutionary theory and on cooperation in strategic alliances, we next discuss these three principles and illustrate their relevance in franchising. Besides, we point out limita-

tions of applying them to management contexts (for example, settings with incomplete information or large groups) and suggest how to tackle such issues by drawing on recent insights from evolutionary theory, including cultural transmission mechanisms and their role in the evolution of cooperation.

**Kin Selection and the Role of the Franchisor**

One conduit how cooperation can develop concerns the "relatedness of firms". In the context of interfirm networks, "relatedness" is obviously used in a metaphorical sense. Both social psychology and organizational learning research reveal that actors are generally more attracted to others who resemble them (for example, Byrne, 1969; Chung, Singh, & Lee, 2000; Darr & Kurtzberg, 2000). Individuals are more open to similar others as they perceive, for example, better chances for validating and assimilating the information received, reduced cognitive dissonance, or increased predictability of behavior (Jackson, Brett, Sessa, Cooper, Julin, & Peyronnin, 1991; Karra et al., 2006). Likewise, research on potential solutions to the prisoner's dilemma indicates that cooperation is more likely if actors show high degrees of homogeneity (Cable & Shane, 1997; Durett & Levin, 2005; Pruitt & Kimmel, 1977). For example, demographic similarity has been shown to encourage cooperation (Henrich & Henrich, 2006). McPherson, Smith-Lovin, and Cook (2001) note, "We are more likely to have contact with those who are closer to us in geographic location than those who are distant.", and, "It takes more energy to connect to those who are far away than those who are readily available". Cohen et al. (2001) study an iterated prisoner's dilemma game with conditions in which cooperation would typically not occur, and establish that cooperation also emerges in context-preserving social structures (that is under *persistent* interaction patters that determine who will interact with whom). Durett and Levin (2005)

also show that the creation of stable social groups is fostered simply by imitation behavior, if individuals preferentially imitate others similar to them. Consequently, these findings suggest an essential importance of the kinship concept in the context of inter-firm alliances.

Accordingly, to describe cooperative dispositions in a network, we build on the notion that interactions among "related" firms are more likely. Here, "relatedness" of firms is understood as the probability of sharing the same strategic orientation (that is, cooperation vs. defection) which can be based on for example, shared cultural backgrounds, experiences, or attitudes.[1] Let the share of each firm's interactions with its related firms be $r$. The share of other interactions of a firm, $1 - r$, is assumed to be with random firms from the population, that 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 (fitness) of a cooperator is $f_C(x) = r(b - c) + (1 - r)x(b - c) + (1 - r)(1 - x)(-c)$. In contrast, the fitness of a defector is $f_D(x) = r(0) + (1 - r)xb + (1 - r)(1 - x)(0) = (1 - r)xb$. The question becomes "What is the critical share of interactions $r$ between related firms for cooperation to 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 firms exceeds the cost-benefit ratio $r > c/b$, cooperation develops. Then, cooperation is an evolutionary stable strategy and replicator dynamics indicate that cooperation is dynamically stable. Obviously, the share of interactions among related firms, $r$, can replace the coefficient *beta* in the core principle above. Concerning this principle, the interpretation of the "relatedness condition" is that member firms take similarity characteristics as

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[1] Concepts from evolutionary theory and sociology offer similar insights, in particular, "green beard" models (for example, Dawkins 1976) and "homophily" in human societies (e.g., Durett, and Levine 2005; McPherson et al. 2001).

cues to assess the likelihood that they are bestowing benefits on another cooperator (as franchisees invest equity long term, there is a motivation to select interaction partners wisely). Recent work shows that this rule also plays a role for the evolution of altruism in the standard *n*-players prisoner dilemma (Fletcher & Zwick, 2007).

Keeping these results in mind, we now consider the role of the franchisor in selecting appropriate member firms for the network to achieve a proper level of relatedness. A franchise network's success largely depends on the systematic screening of franchisees (Ireland et al., 2002; Justis & Judd, 1989; Tatham, Douglas, & Bush, 1972). Through adequate selection mechanisms, the franchisor seeks to secure high-quality input provision by franchisees and increase chances for strong local outlet performance. Many franchisors stipulate specific personal characteristics (for example, education, entrepreneurial mindset) or skills (for example, experience in the industry, selling skills) as required to successfully apply for a franchise (Jambulingam & Nevin, 1999). A central goal of the selection process must also be to ensure *cooperative intent*, that is, applicants' willingness to adequately contribute to joint production in the network (like engaging in mutual learning, maintaining uniformity of the concept, and increasing brand name value). In the ideal case, this would lead to a population made up of solely cooperators, which has the highest fitness – in contrast to a population of defectors that has the lowest (Nowak, 2006b). Therefore, franchisors can provide fertile conditions for the emergence of prolonged, high-quality cooperation in their networks, by structuring and homogenizing franchisee populations (similarly, Ireland et al., 2002, on managing alliances) on the basis of consistent criteria (Figure 1).

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Insert Figure 1 about here
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Taken together, evolutionary theory suggests that cooperation is more likely to occur if cooperators can get in touch with other cooperators. Building on these grounds, structuring franchisee populations by screening will enhance franchise partners' "degree of relatedness" or similarity. By homogenizing the franchisee population, the chain management can contribute to raising the share of cooperators, $r$, within the community (see Figure 1) and, therefore, make it more likely that the condition $r > c/b$ for the evolution of cooperation is fulfilled. Thus, through screening, franchisors can set advantageous conditions for cooperation to prevail as an evolutionary stable strategy.

> *Proposition 1a. Franchisees tend to cooperate more with others the higher the homogeneity within the franchise population (as a consequence of selection).*
>
> *Proposition 1b. The quality of cooperation with others increases the higher the homogeneity within the franchise population (as a consequence of selection).*

**Reciprocity and the Emergence of Cooperation in Franchise Networks**

There are two types of reciprocity that are both important for the emergence of cooperation among franchisees. *Direct reciprocity* (or "If you scratch my back I scratch yours") describes a mechanism that allows cooperation to emerge when there are repeated encounters between the *same* two firms. Previous research, for example by Kogut (1989), Parkhe (1993), Cable and Shane (1997), Das and Teng (2000), or Greve and Salaff (2003), has suggested that the frequency of interactions and the time horizon over which encounters between firms occur matter for the stability of inter-firm relationships. In particular, direct ties between actors are a central source of information about their behavior and expectations (Aarstad et al., 2010; Cowan, Jonard, & Zimmermann, 2007; Gulati, 1998). The second type is *indirect reciprocity* (or "I scratch your back and somebody else will scratch mine"). The idea is that social systems, as well as markets, do not function exclusively via repeated interactions between the same firms or individuals. Rather, rep-

utation mechanisms allow firms to assess another firm's likely behavior by indicating how this firm has behaved in interactions with other population members (Cowan et al., 2007; Hanaki et al., 2007; Parkhe, 1993). Such "indirect" reciprocity is based on the concept of structural embeddedness and the notion of "status" in a network (Cowan et al., 2007; Gulati, 1998). Then, if the good reputation of a firm causes others to behave cooperatively towards this firm, it pays to invest in reputation, that is, to cooperate even in cases where a transaction is not intended to be repeated. As members with "bad" reputation can be punished by others through exclusion from future cooperation (that is "they are not trusted anymore"), there is an obvious link to moral norms in human societies (Nowak & Sigmund, 2004).

First, we describe how repeated interactions can lead to cooperation by *direct reciprocity*. Consider again the payoff matrix (#1) and assume that the member firms play the game repeatedly. The probability that the next round of the game is played is denoted by $w$, and the game is terminated with a probability of $1 - w$. What is a good strategy to play? The set of strategies is given by the rules governing decisions to cooperate or to defect, and depending on the game's history. Thus, the dimension of strategy space and alternative developments is enormous (Nowak, 2006a). Here, to keep things as simple as possible, we focus on the well-known Tit-for-tat (TFT) strategy that has been proven to be robust in simulated computer tournaments (Axelrod & Hamilton, 1981; Nowak, 2006a). TFT starts with cooperation and then replicates what the other firm did in the previous round. Once established, TFT cannot be crowded out by any other strategy if the probability $w$ of meeting again is sufficiently large (Axelrod & Hamilton, 1981). Hence, TFT is evolutionary stable, and cooperation prevails in the population. To illustrate the point, let us compare TFT and choosing the strategy ALLD, a strategy that always defects. Given that the

average (or expected) number of rounds played is $1/(1-w)$, the payoff matrix of the repeated game is

$$
\begin{array}{c@{\quad}c@{\quad}c}
 & TFT & ALLD \\
\begin{array}{c} TFT \\ ALLD \end{array} &
\left( \begin{array}{cc}
(\frac{b-c}{1-w}, \frac{b-c}{1-w}) & (-c, b) \\
(b, -c) & (0,0)
\end{array} \right) &
\end{array}
\tag{2}
$$

since TFT meeting TFT leads to mutual cooperation and all the other encounters lead to defection with a future payoff of *0*. The question is now if TFT is evolutionary stable, that is, if it is stable against invasion by ALLD. Using the replicator equation, we see that (TFT, TFT) is stable if $(b-c)/(1-w) > b$, which shows that TFT can resist invasion if $w > c/b$. That is, if the "shadow of the future" (Das & Teng, 2000; Parkhe, 1993) is sufficiently long, cooperation prevails. Connecting this result to the core principle in evolutionary theory, the probability *w* that interaction with the same firm continues to the next round replaces the coefficient *beta*. Clearly, the longer interaction occurs with the same cooperating member in the network, the higher the degree of cooperation that can be achieved.[2] Note that in cases where the probability *w* is low, or decreased by for example, external influences, cooperation collapses. However, Gintis (2000) shows that in such situations strong reciprocity can counter the collapse as individuals who are strong reciprocators are predisposed to cooperate and punish non-cooperators, even at a personal cost.

For the second type of reciprocity, indirect reciprocity (Nowak & Sigmund, 1998a, 1998b), we consider a simplified set-up to illustrate how the emergence of cooperation can be formalized. Let

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[2] The same condition is used by literature on trust and corporate culture (e.g., Arce 2006; Kreps 1990). However, these authors use a repeated game setup where fully rational players use trigger strategies to play the game, and cooperation is obtained by the punishment threats. The difference to the approach taken in our evolutionary setting is that here, players are only boundedly-rational and do not systematically try to influence the other player's future decisions (see Friedman 1991, 1998). Therefore, the approaches differ substantially in their reflections of real-world behavior.

$q$ denote the probability of knowing the reputation of another firm. For defectors, the reputation of other firms does not matter (they never help anyway). Cooperators only refrain from helping if the other firm's reputation indicates a defector. Thus, a cooperator helps (i) a cooperator and (ii) a defector with a probability $(1 - q)$. This situation can be described by the payoff matrix

$$
\begin{array}{c}
C \\
D
\end{array}
\begin{pmatrix}
\begin{array}{cc}
C & D \\
b - c, b - c & (1-q)(-c), (1-q)b \\
(1-q)b, (1-q)(-c) & (0,0)
\end{array}
\end{pmatrix}. \tag{3}
$$

Cooperation is an evolutionary stable strategy if the condition $q > c/b$ holds. Thus, if the probability of knowing the reputation of the other firm exceeds the cost-benefit ratio, cooperation prevails and resists invasion by other (mutant) strategies. That is, the probability $q$ replaces the coefficient *beta* in the core principle. In this simple model, reputation is binary, either "good" or "bad", depending on the decision to cooperate or defect in the previous round.[3] Next, we discuss three crucial contingency variables that can affect the effectiveness of our three rules (selection and (in)direct reciprocity) for fuelling franchisee cooperation: (1) franchisee network position, (2) franchisee length of chain affiliation ("relationship duration"), and (3) local network (over)size.

*Network position.* **Direct reciprocity** leads to cooperation if the probability, $w$, of another encounter between the same firms exceeds the cooperation's cost-benefit ratio $w > c/b$. Under **indirect reciprocity**, members collect information about their potential partners' former behavior in relationships with third party firms. Indirect reciprocity fosters cooperation if the probability, $q$, of knowing another member's reputation exceeds the cost-benefit ratio of cooperation $q > c/$

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[3] Additionally, Panchanathan, and Boyd (2003) study "standing" strategies where e.g., defection can be justified if the other firm is in bad standing (that is, this firm is known to have defected before), so that a "justified" defection has no effect on the focal firm's standing. They demonstrate that also in standing-based strategies cooperation can be stable.

*b*. If franchisees occupy central network positions, that is, if they are situated in locations with a relatively high number of store owners in the neighborhood, they should face fertile conditions for collaboration, e.g., in terms of mutual knowledge exchange (similarly, Gulati, 1998; Hanaki et al., 2007; Powell, Koput, & Smith-Doerr, 1996; Tsai, 2004). Franchisees being co-located share low-cost opportunities for frequent interaction, for example, personal visits can be realized with comparably low time and capital investment. Nearby franchisees 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 cooperative franchisee knows the reputation of another store owner should increase due to proximity, as it will be easier for co-located franchisees to remember, observe, and validate behavioral information – that is, a firm's reputation should be more accurately assessed by nearby firms due to monitoring opportunities and higher visibility. Co-located franchisees should thus be able to enhance the degree of bestowing benefits only on cooperators. Substantiating this idea in the context of the prisoner's dilemma, researchers argue that high-quality cooperation is more likely to emerge when it is easy to observe and to obtain information on others' strategies (Abreu, Milgrom, & Pearce, 1991; Cable & Shane, 1997). Then, despite potential competition among network members, cooperation may increase.

As regards indirect reciprocity, being proactively helpful to others nearby – even without directly receiving benefits in return – may be a reasonable strategy because being generous and "making a show of it" contributes to reputation-building. Henrich and Henrich (2006) point out that cooperative "broadcast acts" obviously pay off better if many members of the firm's network take notice. Eventually, cooperative efforts are most visible to firms in the neighborhood, where also the probability of meeting again is high. Thus, investing in broadcasting acts should be more

effective if potential cooperators belong to the same geographical area. Here, the probability of the signaling unit to be (locally) known as a cooperator should increase more strongly. Co-located store owners should display both a higher probability, $w$, of meeting again (direct reciprocity), and a higher probability, $q$, of knowing the reputation of another player (indirect reciprocity).

> *Proposition 2a. Franchisees tend to cooperate more with others if they occupy locations with a relatively high number of others in their neighborhood.*
>
> *Proposition 2b. The quality of cooperation with others increases if they occupy locations with a relatively high number of others in their neighborhood.*

*Relationship duration.* Direct and indirect reciprocity depend on interaction experience and memory. Accordingly, a franchisee's system membership duration may be an indicator for the amount of past interaction with other chain members, for example, through training days, seminars, meetings asf. Such shared experiences generate knowledge about other members' intentions and capabilities and help identify reliable partners (similarly, Borgatti & Cross, 2003; Reagans, Argote, & Brooks, 2005; Zollo et al., 2005). Also, long-term network affiliation should be positively related to knowledge a franchisee holds about others' past interactions and attitudes towards cooperation. Thus, experience gathered over time enhances the probability, $q$, of knowing the reputation of another firm, which contributes to satisfying the condition $q > c/b$ to secure cooperation through indirect reciprocity. Moreover, over time, firms can develop higher capabilities for organizing interaction as well as for information processing, so that experience in collaborating increases the quality and usefulness of further cooperative activities (Cohen & Levinthal, 1990; Ingram & Baum, 2001; Powell et al., 1996; Simonin, 1997). We also expect that franchisees with long-term network membership are rather identified for "what they are" (cooperators

or defectors), since their record of past behavior is long, thereby increasing the probability that others have found out about it.[4]

Relationship duration might also indicate a franchisee's tendency to stay in the network in the future. Despite temptations to defect when contracts are about to expire soon, long-term membership has been argued to positively influence expectations about continuous future exchange (Dant & Nasr, 1998). Then, for more experienced franchisees, the probability, $w$, of another encounter should be relatively high, which helps satisfy the condition $w > c/b$ for direct reciprocity to foster the evolution of cooperation. As Henrich and Henrich (2006) argue, "being NICE should depend on cues about how long interactions might go on, and whether there are other reciprocating strategies out there to cooperate with." Thus, long-term affiliations to franchise chains should both enhance the probability, $w$, of meeting again (direct reciprocity), and the probability, $q$, of knowing the reputation of another player (indirect reciprocity).

> *Proposition 3a. Franchisees tend to cooperate more with others as the length of network membership increases.*
>
> *Proposition 3b. The quality of the cooperation with others increases as the length of network membership increases.*

*Local Network (Over)Size.* We argue that franchisees face fertile conditions for inter-partner cooperation, given they choose to cooperate, if they occupy locations with a relatively high number of other franchisees in their neighborhood. However, the beneficial effects of holding such central network positions might be offset by countervailing effects of *oversized* network communities. Franchisees sometimes complain about "territorial encroachment", meaning that franchisors add *too many* units proximately to franchisees' existing outlets, which leads to more intense

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[4] From the franchisor's perspective, long relationship duration can also be an indicator that decision leeway has been used constructively by franchisees, as selection pressures in the network should favor those franchisees who bestow benefits on others; particularly, as they expect benefits to be returned (Eisenhardt 1989; Henrich, and Henrich 2006).

intra-chain competition (Kalnins, 2004; Kaufmann & Rangan, 1990; Sheridan & Gillespie, 1995). If exclusive territory clauses do not prevent (perceived) encroachment, defective behavior (for example, intentional withholding of information) may be a likely consequence of oversized communities. Besides, kin selection may become harder as suitable applicants may not be interested in proposed locations. Shane (2001) put forward further arguments why agency hazards exacerbate with increasing network size: Monitoring becomes difficult, and as the chain's brand name value, if managed properly, grows with the number of outlets (Lafontaine, 1992), incentives for free-riding may be stronger in large systems than in small ones. Moreover, observing and remembering others' behavior gets complex as communities grow due to limited individual informational capacities. Consequently, it will be harder for each franchisee to build up and memorize transaction histories as the probability of meeting again, $w$, declines. Besides, the probability of knowing another player's reputation, $q$, also decreases, and there is a higher risk of receiving ambiguous information about what others might have done in the past, which makes indirect-reciprocal strategies difficult to pursue. Likewise, Henrich (2004) concludes: "The amount of cooperation supported by indirect reciprocity declines exponentially with increasing group size". Accordingly, indirect reciprocity favors worthwhile cooperation rather when populations are relatively small and individuals tend to interact repeatedly (Boyd & Richerson, 1989; Henrich, 2004; Nowak & Sigmund, 1998a). In sum, network oversize should deter cooperation as oversize decreases both the probability, $w$, of meeting again (**direct reciprocity**), and the probability, $q$, of knowing the reputation of another player (**indirect reciprocity**).

*Proposition 4a. Franchisees tend to cooperate less with others as they perceive their local network as being oversized.*

*Proposition 4b. The quality of cooperation with others decreases as they perceive their local network as being oversized.*

**THE ROLE OF CULTURAL LEARNING IN THE EVOLUTION OF COOPERATION**

Scholars and practitioners alike have attributed the dominance of franchises in retail and service sectors to cooperation-related benefits: Advantages of a well-reputed brand name, access to the chain's experience, and being part of a community of entrepreneurs that are qualified to translate a business concept into action, are factors that often prove unbeatable by any other organizational form (Kalnins & Mayer, 2004; Love, 1986; Shane, 2005). The three principles discussed above – kinship, indirect and direct reciprocity – are highly relevant, but might not always function sufficiently for cooperation to emerge. For example, as outlined, indirect reciprocity works well in small groups, but usually works less well in large groups. Besides, in noisy environments misunderstandings and misreadings of actions can lead to a reduction in cooperation (quality), and reliable information on the reputation of another firm might not be readily available. These factors add to difficulties in explaining large-scale cooperation and demonstrate a need to describe the functionality of these three principles based on additional mechanisms.

*Cultural learning,* based on *social learning* and *cultural transmission mechanisms*, is an important factor that enables cooperation even under unfavorable conditions, by complementing and supporting the three principles we discuss. Selection processes favor social learning and entrepreneurial capacities for imitation and adaptation. For example, because of cognitive limitations and costs of information acquisition, firms are often better off if they connect with and learn from successful others via (social) interaction. Recently, researchers have started to employ evolutionary (game) theory to demonstrate that social learning (of the firm) and cultural transmission mechanisms (in the network) can support the evolution of cooperation, where strategies, beliefs, social norms, etc. are learned by observation and interaction in social groups (see Henrich, 2004; Henrich & Henrich, 2006). While formal models of kinship, of direct and indirect reciprocity,

add to our understanding of the drivers that lead to the emergence of cooperation, these recent approaches add rigor to the analysis of network evolution (Cordes et al., 2008; Guzmán et al., 2007; Henrich & Boyd 1998; Simon, 1990). To gain a better understanding of how cultural learning can promote cooperation, we refer again to the core payoff matrix (#1). Assume that social norms can be "weak", "intermediate", or "strict", and that this distinction is made with reference to the psychological costs that a deviation from the internalized social norm imposes on the respective firm. Let the psychological costs be denoted by $z$. So, for a firm which is deviating from its internalized social norm the payoff matrix changes to

$$
\begin{array}{cc}
 & \begin{array}{cc} C & \quad\quad D \end{array} \\
\begin{array}{c} C \\ D \end{array} &
\begin{pmatrix}
(b-c, b-c) & (-c, b-z) \\
(b-z, -c) & (-z, -z)
\end{pmatrix}.
\end{array}
\tag{4}
$$

A social norm is called weak if $z < c$. Then, feelings of "guilt" are too marginal to deter the firm from defecting. In contrast, a social norm is strict if the psychological costs are so high that cooperation is a dominant strategy. Mengel (2008) assumes that such social norms are culturally transmitted through three ways: horizontal transmission (learning from peers); institutional transmission (through institutions of society); and vertical transmission (intergenerational learning). The author explores whether pro-social norms survive in a society even if some members have not internalized them (for example, due to new entry), finding that strict norms need institutional pressures to survive. Yet, intermediate norms survive even in completely integrated societies where members with different degrees of internalization interact.

An important category of cultural transmission mechanisms of such norms are "context biases". Based on context biases firms select features they want to copy (behaviors, ideas, etc.), and their social learning is guided by informative signals which are used to choose "role-models".

Two prominent manifestations of context biases are (1) success and prestige bias and (2) conformist bias. Success- and prestige-biased transmission works as a ranking-based copying bias, where members follow a tendency to copy strategies of more successful and better skilled firms (Bischi, Dawid, & Kopel, 2003a, 2003b; Henrich & Boyd, 2001; Henrich & Gil-White, 2001). In contrast, conformist transmission makes individuals imitate highly frequent patterns of behavior. This approach to adaptation is worthwhile when information about others is noisy and behavioral differences do not obviously covary with success levels (Henrich & Boyd, 2001). Both approaches lead to group homogenization and thus, cooperation. Hence, we suggest that social learning theory provides a valuable frame of analysis that helps understand inter-firm relationships. Importantly, understanding behavior at an individual level requires linking the dynamics of cultural variation at the population level to the psychological mechanisms that shape individual behavior (Gintis, 2004; Henrich & Boyd, 1998). In essence, almost all individuals display pro-social emotions, such as guilt, shame, or empathy that carry rewards for cooperative behavior. Since firms are made up of individuals, and as decision-makers in firms are embedded in their specific cultural environments, social learning arguments should also apply to inter-firm relationships (Cordes et al., 2008). Thus, dynamics of (franchise) network evolution should be studied by including social learning and cultural transmission mechanisms.

*Proposition 5. Cultural learning works towards homogenizing member firms in a franchise network and supports the proliferation of cooperation.*

## SUMMARY AND DISCUSSION

A central challenge in much entrepreneurship research is to explain the emergence and evolution of cooperation despite incentives to profit from defection, that is, free-riding in the franchising case (Hite, 2005; Slotte-Kock & Coviello, 2010). Here, we build on insights from evolution-

ary (game) theory and cultural anthropology, combined with an entrepreneurial perspective on collaboration, to gather new arguments that shed light on this issue. We propose a conceptual model and draw attention to contingencies and mechanisms that enable the dynamic proliferation of cooperative strategies in entrepreneurial settings. In particular, we introduce three evolutionary principles – kin selection, direct reciprocity, and indirect reciprocity, and demonstrate how these can foster cooperation in social dilemma contexts. We argue that these principles are complemented by social learning and cultural transmission mechanisms, for example prestige and conformist biases, so that cultural learning supports the evolution of cooperation (for a summary, see Figure 2).

---------------------------------
Insert Figure 2 about here
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We apply our model to the case of franchising, an attractive context for studying how evolutionary theory can inform the analysis of collaboration. First, the franchisor screens prospective network members; thereby, franchisees' degree of "relatedness" can be enhanced (kin selection). Subsequently, cooperation among franchisees is supported by direct and indirect reciprocity (Hite, 2005; Slotte-Kock & Coviello, 2010). We also discuss three contingency variables that may influence the functioning of these three principles for raising cooperative intent, (1) franchisee network position, (2) chain membership duration, and (3) network (over)size. The propositions lend themselves to future empirical testing. The model helps organizations understand factors that affect cooperative tendencies and processes among its members, and provides direction on how to foster, promote, and fine-tune a cooperative climate in the network – initially, as well as in the long run.

Promising avenues for further research may include striving to transfer and relate additional elements from these and other theories that are novel and relevant to the entrepreneurial context. Future studies could also focus on other real-life network settings, and particularly, provide empirical backgrounds to test propositions, as advanced here, foremost by using longitudinal data that allow scrutinizing the nuances relevant to the developmental process of network interaction. For example, a range of (un)favorable contingencies for realizing kinship and reciprocity may help explain differences in cooperative tendencies and their evolution. Research could thus integrate arguments central to evolutionary (game) theory, cultural anthropology and entrepreneurship in more detail. We believe that bringing together these different approaches is particularly fruitful as rigorous models grounded in evolutionary theory help develop stringent testable propositions that are of practical relevance to the management field.

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**FIGURES**

**FIGURE 1: Franchisor Selection Procedure Targeted towards Choosing "Kins"**



*Pool of applicants*

*Pool of franchisees*

*Partner selection by franchisor* ("kin-based")
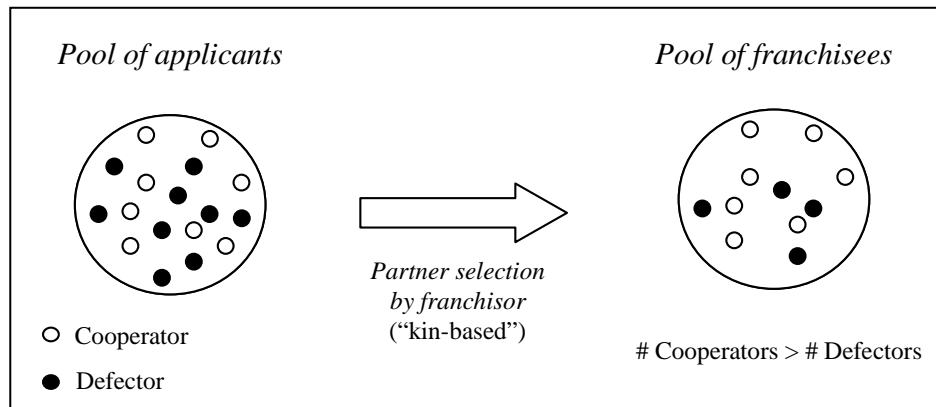
○ Cooperator

● Defector

# Cooperators > # Defectors

**FIGURE 2: Evolutionary Rules and Emergence of Cooperation**



**Level of abstraction**

**Evolutionary rules of cooperation**

*Functionality affected by*

**(Cultural) mechanisms**

**Contingency variables**

Indirect reciprocity        Kin selection        Direct reciprocity

Success-   and prestige-biased transmission

Conformist-biased transmission

Network position
Relationship duration
Network (over)size

Inter-Franchisee Cooperation

**Evolutionary (game) theory**

**Cultural anthropology**

**Theory of networks; empirical testing in real-life settings, (e.g., franchise) networks**