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Societal threat and cultural variation in the strength of social norms: An evolutionary basis

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ABSTRACT

The strengths of social norms vary considerably across cultures, yet little research has shown whether such differences have an evolutionary basis. Integrating research in cross-cultural psychology with evolutionary game theory, we show that groups that face a high degree of threat develop stronger norms for organizing social interaction, with a higher degree of norm–adherence and higher punishment for deviant behavior. Conversely, groups that have little threat can afford to have weaker norms with less punishment for deviance. Our results apply to two kinds of norms: norms of cooperation, in which individuals must choose whether to cooperate (thereby benefitting everyone) or enrich themselves at the expense of others; and norms of coordination, in which there are several equally good ways for individuals to coordinate their actions, but individuals need to agree on which way to coordinate. This is the first work to show that different degrees of norm strength are evolutionarily adaptive to societal threat. Evolutionary game theoretic models of cultural adaptation may prove fruitful for exploring the causes of many other cultural differences that may be adaptive to particular ecological and historical contexts.

Introduction

The development and enforcement of social norms is a unique feature of human sociality that transcends history and groups. The capacity for social learning and cultural transmission enables humans not only to develop, maintain, and enforce social norms, but also to pass them on to future generations. For any cultural group, social norms serve a critical function in that they enable the group's members to coordinate social action and accomplish tasks. Yet while social norms are universal, the strength of social norms varies widely around the globe. Research has shown, for example, considerable cross-cultural variation in norms for fairness, cooperation, and the willingness to punish to enforce such norms (Balliet & Van Lange, 2013; Ensminger & Henrich, 2014; Gelfand et al., 2011; Henrich et al., 2006, 2010; Herrmann, Thöni, & Gächter, 2008). Understanding the evolution of norms and how differences in norm strength arise through the process of cultural adaptation is an important part of understanding our complex social world.

In this research, we explore how cultural differences in norm strength, defined as degree of adherence to norms and punishment of norm-deviance (Gelfand et al., 2011), emerge from the evolutionary process of cultural adaptation. While there are many different types of social norms, we focus on *norms for organizing social interaction*, which includes both cooperation and coordination norms. We test the notion that cultures' exposure to societal threat is a mediating factor in differences in norm strength. In contexts of high threat—whether it is ecological threats like natural disasters—or manmade threats such as threats of invasions—we expect societies evolve to have stronger norms for coordinating social interaction because they are necessary for survival. By contrast, in contexts low threat, we expect there to be less need to coordinate social action, affording weaker norms and more tolerance for norm violating behavior.

Some indirect evidence for this supposition can be found across numerous disciplines. For example, political scientists have long argued that when nations are involved in external conflicts and must face the possibility (or reality) of invasion from foreign nations, they need to develop internal order and cohesion in order to successfully deal with the enemy (Cosner, 1956; Sumner, 1906). As cogently argued by (1906), "the exigencies of war with outsiders are what make peace inside, lest internal discord should weaken the we-group for war" (p. 12) (see also Kesebir, 2012). Likewise, anthropological research has shown that groups that have a dearth of natural resources need strong norms for coordination for survival (Lomax & Berkowitz, 1972). More recently,

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Gelfand et al. (2011) found that societies that have had high degrees of territorial threats, low natural resources (e.g., food supply), and high degrees of natural disasters (e.g., floods, cyclones, and droughts) were *tight*, i.e., had more compliance with social norms and a restriction of range of what was appropriate, as compared to societies that were *loose* and had low levels of these threats. Nevertheless, while such studies provide evidence that threat may be an important factor in the evolution of strong norms for organizing social interaction, no research to date has examined whether groups actually *require* stronger norms and associated punishment of deviance in order to survive under high threat. More generally, whether differences in punishment across societies have any *evolutionary basis* remains unclear.

To fill this void, we use evolutionary game theoretic (EGT) modeling to explore whether stronger norms with higher punishment of deviance are evolutionarily adaptive under conditions of higher societal threat. Norms are a very broad concept, with many types of norms that differ in various ways—but as noted above, we are specifically interested in social norms that facilitate organized social action. Within this subset of norms, we examine two general types of norms: norms of cooperation and norms of coordination. In norms of cooperation, an individual has a temptation to not adhere to the norm of cooperating in order to acquire an immediate benefit at the other's expense. In norms of coordination there exists no such temptation, only different ways of coordinating. To explore these norms we use cooperation games (Study 1) and coordination games (Study 2), and in both studies we assess how threat affects the strength of norms, including the degree to which deviance from the norm is tolerated or punished, that emerges in populations.

Before we describe our model and results in detail, we first provide a brief primer on relevant concepts and techniques from evolutionary game theoretic modeling.

Evolutionary game theory applied to human behavior and cultural adaptation

The evolutionary game theoretic (EGT) computational models that we employ in this research are best viewed as a complementary methodology to other methods appearing in this special issue. Computational modeling, including EGT and computational multi-agent system models, are increasingly being used in psychological science. As a complementary approach to study social and organizational phenomena, organizational scholars have described computational modeling as the "third scientific discipline" (Ilgen & Hulin, 2000). Computational approaches have been fruitfully applied to topics such as motivation (Scherbaum & Vancouver, 2010; Vancouver, Putka, & Scherbaum, 2005; Vancouver, Weinhardt, & Schmidt, 2010), job attitudes and withdrawal (Seitz, Hulin, & Hanisch, 2000), personality (Read & Miller, 2002), gender (Martell, Lane, & Emrich, 1996), among others (Ilgen & Hulin, 2000). Tutorials and primers on computational approaches have appeared in journals such as *Journal of Applied Psychology* (Vancouver, Weinhardt, et al., 2010), *Journal of Management* (Vancouver, Tamanini, & Yoder, 2010), and *Organizational Research Methods* (Vancouver et al., 2005). We build on this effort and use EGT modeling to gain insights into the dynamics of social norms for organizing social interaction and the enforcement of such norms through punishment.

Evolutionary game theory (Alexander, 2009; Hofbauer & Sigmund, 1998; Smith, 1980, 1982; Weibull, 1997) studies the effects of (socio-cultural or biological) evolutionary pressures on populations of agents under the general framework shown in Fig. 1. It assumes a population of agents with assigned strategies (i.e. behaviors) at time *t*. These agents interact in a game that models a situation of interest, e.g. a prisoner's dilemma game

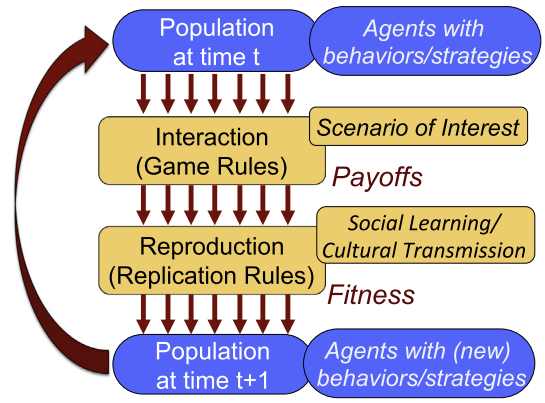

Fig. 1. Evolutionary game theory framework for studying evolution of behaviors.

(Rapoport, 1965). After agents interact in the game and are assigned payoffs based on the game's definition, they reproduce into the next population at time $t + 1$, according to a reproduction rule in which the agents' reproductive fitness depends on their payoffs. Generally speaking, agents who received a high payoff at time *t* are "more fit" in the sense that their strategies are likely to be used by a larger number of agents at time $t + 1$. In the context of human social behaviors, agents' strategies represent behaviors; and reproduction is not necessarily biological, but may be interpreted as the processes of learning (Harley, 1981) or the cultural transmission and change of memes, behaviors, and norms in human societies (Boyd & Richerson, 1988; Dawkins, 2006). As such, reproduction of behaviors reflects humans' unique capacity for social learning (Schlag, 1998, 1999; Taylor & Jonker, 1978; Traulsen & Hauert, 2009).

Since human social systems are highly complex, EGT models are highly simplified models that omit most of the details of human interactions. The aim is to design models so that they accurately reflect the essential nature of the interactions that are being studied. Such models are too abstract to provide exact numeric predictions of human behavior, but these models can be used to provide explanations of the central dynamics underlying the interactions and behaviors of interest. The basic effects of various factors on evolutionary outcomes can be tested through "virtual experimentation" by computer simulation (Winsberg, 2003), and support for causal relationships between these factors and outcomes can be established. Since the evolution of behaviors through social learning and cultural adaptation in populations over time is difficult if not impossible to study in laboratory or field studies, EGT modeling provides a useful tool to apply and explore related theories and hypothesis.

The evolutionary games framework adds an important dynamical approach for studying how human behaviors in populations evolve over time. Often, aside from describing the evolutionary trajectories and interactions of different behaviors or strategies, the aim is to find and describe *evolutionary stable states*. An evolutionary stable state, informally speaking, is one in which the relative proportions of strategies in a population have stabilized, and the population will revert to these same proportions if one introduces an arbitrarily small number of new agents with different strategies (Smith, 1980). In terms of culture, a stable state in strategies represents the behavioral norms that are adaptive and can be expected to remain in a population under the given conditions.

To this date, EGT approaches have been used to study the evolution of a great variety of social and cultural phenomena. Examples of such phenomena studied through evolutionary games include cooperation, altruism, and reciprocity (e.g., Axelrod & Dion, 1988; Axelrod & Hamilton, 1981; Bendor & Swistak, 1995;