Journal of Economic Behavior & Organization 107 (2014) 1–9

Contents lists available at ScienceDirect

Journal of Economic Behavior & Organization

journal homepage: www.elsevier.com/locate/jebo

Ranking friends☆

Yossi Feinberg[a,1], Willemien Kets[b,*]

[a] Graduate School of Business, Stanford University, United States
[b] Kellogg School of Management, Northwestern University, United States

ARTICLE INFO

Article history:
Received 9 December 2013
Received in revised form 18 August 2014
Accepted 21 August 2014
Available online 6 September 2014

JEL classification:
C72
C73
D85

Keywords:
Networks
Repeated games
Cooperation

ABSTRACT

We investigate the scope for cooperation in a community engaged in repeated interactions. Players seek the help of others and approach them sequentially according to some fixed order. This defines a ranking profile: a list for each player describing the order in which he approaches other players for help. We study the ranking profiles that are most effective in sustaining cooperation in equilibrium. It turns out that these are the profiles that spread the costs of helping equally. We provide a characterization of these socially optimal profiles that holds across all (generic) games, i.e., that does not make reference to the game parameters, in terms of a *global balance* property. We also study the socially optimal profiles when only the victims punish the deviator. These profiles can be characterized in terms of a more demanding *local balance* property.

1. Introduction

Among the characteristics of any social structure is the nature of reciprocal interaction among its members. This paper is concerned with a particular type of interactions, namely, one in which the members of a community repeatedly face problems that require the assistance of others. Consider a group of friends, say, Alice, Bob, and Carol. Alice is moving to a new apartment and needs a friend to help her carry boxes. Helping Alice would be costly to both Bob and Carol, as they will each have to take a day off from work. If we assume that Alice needs only one friend to help, it will be inefficient to ask both friends simultaneously, because of the possibility that they both show up to help and thus miss a day from work. If Alice asks just one friend, say, Carol, first, and she is unable to help Alice move – perhaps because her boss does not approve, or because she has prior commitments – then Alice can ask Bob.

Suppose that over time, the three friends encounter similar problems on a regular basis. As long as the value of the assistance that each of the friends receives exceeds the average cost of helping, the socially optimal outcome is one in which every player helps the other two. It may, however, be more difficult to attain this maximum level of cooperation when players approach others sequentially, i.e., when they rank their friends.

☆ We are grateful to Nageeb Ali, David Kreps, and Brian Rogers for stimulating discussions, and to two anonymous referees and the Editor, William Neilson, for helpful suggestions. Much of this research was carried out while Willemien Kets was visiting Stanford University. She thanks Stanford University for its hospitality and support.

* Corresponding author. Tel.: +1 505 204 8012.
E-mail addresses: yossi@gsb.stanford.edu (Y. Feinberg), w-kets@kellogg.northwestern.edu, willemien.kets@gmail.com (W. Kets).
[1] Tel.: +1 650 725 0331.

http://dx.doi.org/10.1016/j.jebo.2014.08.005
0167-2681/

Alice	Carol	Bob
Bob	Carol	Alice
Carol	Alice	Bob

(a) An example of a ranking profile with different expected costs

Alice	Bob	Carol
Bob	Carol	Alice
Carol	Alice	Bob

(b) An example of a ranking profile with equal expected costs

Fig. 1. Two possible ranking profiles. The first column indicates the player seeking help. Each corresponding row lists the other players in the order in which they are approached.

To see this, assume that all three players receive the same benefits each time they are helped, incur the same costs each time they assist others, and need help with the same frequency. Suppose also that both Alice and Bob always ask Carol for help first, as Fig. 1(a). In that case, Carol is asked for help every time that Alice and Bob have a problem. By contrast, Bob is called upon to help Alice only if Carol was unable to help, and to help Carol only if Alice was unable to help. Since he is asked to help less frequently than Carol, costs are distributed unevenly. On the other hand, in expectation, Alice, Bob, and Carol each receive the same amount of help if all players help whenever asked to do so: each has two friends to whom they can go for help.

That is, while the expected cost for a player depends on the exact structure, her expected benefit depends only on the number of players who are willing to help her. This suggests that it may be hard to incentivize Carol to help her friends when they ask her for assistance.[2]

On the other hand, suppose Alice asks Bob for help first, Bob asks Carol first, and Carol asks Alice first, as in Fig. 1(b). In this case, the expected costs of helping friends are identical across players. Hence, the ranking profiles – the profiles of ordered lists that specify the order in which players approach each other for help – determine players' expected costs.

The question we address is which ranking profiles are best at supporting the socially optimal outcome. As a first observation, we show that ranking profiles in which players have identical expected costs can sustain full cooperation for the largest range of parameters. In other words, the incentive compatibility constraint is the least binding when expected costs for help are equal among all players. We then turn to our main result, which gives a characterization of the ranking profiles that induce equal expected costs for all (generic) values of the parameters. These ranking profiles are precisely the Latin squares, that is, ranking profiles in which every player appears in a certain position in the list of exactly one other player, as in Fig. 1(b). In other words, Latin squares are ranking profiles in which each player is approached first by exactly one other player, second by exactly one other player, and so on. Latin squares are thus characterized by a *global balance* property: they spread the cost of helping equally in any (generic) game. However, balance needs to be achieved only globally: relationships between any two players need not be balanced. For example, in the ranking profile in Fig. 1(b), Alice asks Bob first, but Bob asks Alice last.

We then turn to the scope for cooperation when only the victim punishes the deviator. This is motivated by empirical research that shows that in many social situations, agents are more concerned with maintaining balance in their own relations than with correcting imbalances within a larger group (Blau, 1964; Fiske, 1992). In addition, this type of enforcement does not lead to a complete breakdown of cooperation in the case of punishment with a grim-trigger strategy, as community enforcement does. If punishments are carried out with simple grim-trigger strategies, individuals may prefer this type of bilateral enforcement over community enforcement.

We find that this type of bilateral enforcement is more successful in sustaining cooperation in some ranking profiles than in others. Intuitively, because bilateral enforcement operates at the level of pairs of individuals, what matters is the balance in expected costs between two individuals, rather than the overall expected costs. That is, global balance is no longer sufficient; balance also needs to be achieved locally. We show that under bilateral enforcement, no ranking profile can outperform a Latin square in which every two players have the same expected costs of helping each other (when the number of players is even), i.e., a Latin square where every pair of players ranks each other at the exact same place. Thus, ranking profiles need to satisfy a *local balance* property when only the victim punishes the deviator. This result is in line with empirical evidence that shows that relationships characterized by high but similar levels of mutual obligation are especially productive (Shore and Barksdale, 1998).

There is of course an extensive literature on reciprocity in strategic settings, going back to the first papers on repeated games. Notable contributions include the work of Ali and Miller (2012), Jackson et al. (2012), Lippert and Spagnolo (2011), Mihm et al. (2009), and Raub and Weesie (1990), which study favor exchange and prisoners' dilemma games on networks;

[2] Alternatively, one could assume that help that arrives from friends that have been asked earlier is more valuable (e.g., by introducing discounting). In that case, our results go through with minor modifications as long as players are sufficiently patient, or, equivalently, as long as the delay between help requests is sufficiently short.