Available online at www.sciencedirect.com
SCIENCE DIRECT®
Journal of Economic Psychology 26 (2005) 711–731
JOURNAL OF Economic Psychology
www.elsevier.com/locate/joep

Indirect reciprocity in cyclical networks An experimental study

Ben Greiner [a], M. Vittoria Levati [b,c,*]

[a] *Department of Economics, University of Cologne, Albertus-Magnus-Platz, D-50923 Köln, Germany*
[b] *Max Planck Institute for Research into Economic Systems, Strategic Interaction Group, Kahlaische Strasse 10, D-07745 Jena, Germany*
[c] *Dipartimento di Scienze Economiche, University of Bari, Via C. Rosalba 53, 70124 Bari, Italy*

Received 15 July 2003; received in revised form 25 March 2004; accepted 18 April 2004
Available online 15 June 2005

Abstract

A cyclical network of indirect reciprocity is derived organizing 3- or 6-person groups into rings of social interaction where the first individual may help the second, the second the third, and so on until the last, who in turn may help the first. Mutual cooperation is triggered by assuming that what one person passes on to the next is multiplied by a factor of 3. Participants play repeatedly either in a partners or in a strangers condition and take their decisions first simultaneously and then sequentially. We find that pure indirect reciprocity enables mutual cooperation, although strategic considerations and group size are important too.

JEL classification: C72; C92; D3

PsycINFO classification: 2300

Keywords: Experiment; Investment game; Indirect reciprocity; Strategic behavior

* Corresponding author. Tel.: +49 03641 686629; fax: +49 03641 686667.
E-mail address: levati@mpiew-jena.mpg.de (M. Vittoria Levati).

0167-4870/$ - see front matter
doi:10.1016/j.joep.2004.04.003

1. Introduction

According to Alexander (1987), networks of indirect reciprocity are crucial for understanding the evolution of large-scale cooperation among humans. Such networks arise whenever individuals help and receive help from different persons: *A* helps *B*, who helps *C*, who helps *D*, who finally helps *A*. Alexander calls this kind of interaction "indirect reciprocity" and considers two possibilities, among others. First, *A* helps *B* only if *B* helps *C*. Second, *A* helps *B* only if *A* receives help from *D*. In both cases, conditional behavior is based on local information. Each agent knows the behavior of the individuals with whom she interacts, but does not know what happens along the entire chain of indirect reciprocity.

So far the literature has focused to a large extent on direct reciprocity, which presupposes bilateral interactions.[1] Less attention has been paid to indirect reciprocity, usually interpreted as rewarding (punishing) people who were kind (hostile) toward others. In most experiments, the "social status" of the potential recipient affects the donor's decision, where the term social status normally refers to an image score, i.e., a record of the individual's past level of cooperation. Recent experimental studies of this form of indirect reciprocity include Wedekind and Milinski (2000), and Seinen and Schram (2001) who examine behavior in a 2-person repeated helping game[2] where donors can observe recipients' image score. They conclude that indirect reciprocity is important since many donors base their helping decision on the image score of the recipient. Güth, Königstein, Marchand, and Nehring (2001) also find evidence of indirect reciprocity in an investment game where, instead of repaying their own donor, recipients repay a different donor whose attitude to cooperation is commonly known.

In this paper, we investigate experimentally the second type of indirect reciprocity envisioned by Alexander. In our experiment, participants know only what happens to them and have no information about the cooperative attitudes of the person whom they may help, or of any other individual in their group.[3] We believe that this form of indirect reciprocity captures real-world situations better than one requiring knowledge about the recipients' image score. In general, one would expect that individuals have much better information about what others did to them than about others' interactions with third parties.

To implement networks of indirect reciprocity, we use a variant of the investment game introduced by Berg et al. (1995). We arrange individuals into a ring of *n* players

[1] Many experimental studies have observed direct reciprocal behavior, which can be either positive (rewarding kind actions) or negative (punishing unkind actions). Relevant studies include public goods games (Brandts & Schram, 2001; Croson, 2000), ultimatum games (Camerer & Thaler, 1995; Güth, Schmittberger, & Schwarze, 1982), investment games (Berg, Dickhaut, & McCabe, 1995; Gneezy, Güth, & Verboven, 2000), and gift exchange games (Fehr, Kirchsteiger, & Riedl, 1998b; Gächter & Falk, 2002).

[2] The helping game is a degenerate game in which a donor has the choice of either "helping" a recipient at a cost smaller than the recipient's benefit, or "passing," in which case both individuals receive zero.

[3] This type of indirect reciprocity has been studied theoretically by Boyd and Richerson (1989) who investigated its evolutionary properties, and experimentally by Dufwenberg, Gneezy, Güth, and Van Damme (2001) who aimed at comparing it to direct reciprocity.