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The Territorial Prior-Residence Effect and Children's Behavior in Social Dilemmas

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Research on territorial behavior has focused on animal populations, and relatively little has dealt with territoriality in humans, except in the area of human sports. This study was an investigation of the prior-residence effect on children's behavior in social dilemmas. The analysis was carried out by means of research designed for preschool children who played a dictator game and an ultimatum game. This study demonstrates the advantages of being on one's own turf. The authors found that children playing in their own classroom obtained more from games than did those playing in their partners' classroom. In contrast, not being in their own classroom and not having the power to dictate in the ultimatum game were seen as an underlying reason why children propose more offers to their partners. The theoretical and practical implications of these findings for the evolution of prosocial behavior are discussed.

Keywords: *prior-residence effect; prosocial behavior; social dilemma; preschool children*

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Territorial behavior is widespread throughout the animal kingdom, and in many species it is the basis of mating and of social organization in general. There is long-standing evidence that animals in their own territories have an advantage in confrontations with other animals. An individual usually wins encounters with intruders on its own territory, while losing encounters when intruding onto another's territory. For example, a fish in a familiar aquarium invariably assumes dominance over other fish that are introduced later (Figler & Evensen, 1979), and a chicken is more likely to peck a strange bird in its home cage than in a stranger's cage (Rajecki, Nerens, Freedenburg, & McCarthy, 1979).

McAndrew (1993a) labeled the advantage enjoyed by the owner of a territory over a visitor or intruder to that territory as the *prior-residence effect*. Such an effect has also been termed *home advantage* (McAndrew, 1993b; Smith, 2003), *home-cage advantage* (Rajecki et al., 1979), *home-court advantage* (Bauer & Washowiak, 1977), *home-ice advantage* (Woodland & Woodland, 2001), or *home-field advantage* (Gandar, Zuber, & Lamb, 2001), depending on the participants and the form it takes.

Most evidence and empirical support for the prior-residence effect comes from ethological studies on animals ranging from fish to primates (e.g., Braddock, 1949; Heuts & Nijman, 1998; Holberton, Hanano, & Able, 1990; Nijman & Heuts, 2000). Without any doubt, biologists are interested in the phenomenon for its importance in animal behaviors, such as mating, feeding, and so on, whereas psychologists have been interested in it for its salience and predictability in the interaction or competition of groups or individuals (Carron, Loughhead, & Bray, 2005; Courneya & Carron, 1992; Edney, 1976). It is worth noting that home advantage in sports competitions has been a well-documented phenomenon (Carron & Hausenblas, 1998; Courneya & Carron, 1992). Many studies show that home teams have a distinct home-court advantage over visitors in competition (e.g., Greer, 1983; Silva & Andrew, 1987). Carron and Hausenblas (1998) suggested that the home advantage, present in both professional and amateur sports, was generalizable across gender. As Courneya and Carron (1992) pointed out, the strength and consistency of the home advantage had made it a popular phenomenon in sports today.

The advantages of being on one's own turf have been demonstrated in a number of parallel studies on such forms of human interaction as implementation, negotiation, and compliance, despite the fact that it is an open question as to whether the same mechanisms are responsible for territorial behavior in humans as in animals (Edney, 1976). Esser (1970) has shown that psychotic patients are more successful at influencing others in their

home territory than in other areas. Martindale (1971) has reported that dormitory residents were more successful at a negotiation task on "their own turf" than visitors were. Harris and McAndrew (1986) found that people could resist signing offensive petitions better when approached in their own rooms than when they were approached somewhere else. Marcus and Sarkissian (1988) suggested that residents could have some control over their home environments and effect changes through tenant participation in management or through cooperative arrangements. Sommer (2002) pointed out that as territoriality was used for vital, life-sustaining activities, a spatial invasion of a person's territory would provoke greater resistance than an invasion of other settings.

As such, the question raised is whether territorial behavior is practiced by human decision makers in the course of their handling social dilemmas.

Prosocial Behavior

Although definitions of prosocial behavior vary, all of them involve a few elements, such as values, goals, motives, and situations. According to Staub (1979), prosocial behavior is defined as behavior that benefits another and is intended to do so, including sharing, cooperation, helping, donation, and comforting, and so on.

A few existing studies have been concerned with dispositional and situational determinants of prosocial behavior (Batson & Powell, 2003). On the one hand, the dispositional factors show the stability in prosocial behavior, involving personality, intelligence, autonomy, empathy, and perspective taking (Gagné, 2003; George, 1990; Iannotti, 1985; Krebs & Sturupp, 1982; Staub, 1984). On the other hand, prosocial behaviors always vary over time and across places, and the situational determinants are used to designate at least two kinds of influence (Eisenberg & Mussen, 1989): (a) striking, unique events, and (b) temporary external conditions and singular experiences, or transient moods and emotions. The topic of whether dispositional or situational factors are better predictors of behavior has been debated since the 1970s. However, proposed predictors of prosocial behavior have proliferated well beyond the initial dichotomy between the two determinants, the combination of which produces the cognitive and affective reactions, which are the most proximal predictors of prosocial behavior (Eisenberg, Fabes, & Spinrad, 2006).

It is interesting to note that previous studies have examined the effects of a physical stimulus from the environment (e.g., noise, density and

crowding, temperature) on prosocial behavior. For example, in a large shopping mall, the frequency of helping was higher in the presence of pleasant fragrances than in their absence (Baron, 1997). The users of a university gym offered to help more on a high-cost, leaflet-distributing task when in the presence of uplifting music than they did with annoying music (North, Tarrant, & Hargreaves, 2004). When leaving an uncomfortably hot laboratory, the participants were less likely to help (Page, 1978). People who received a joke card were more likely to tip than were people in the control condition or when an advertisement card accompanied the bill (Gueguen, 2002). Pink paper would have the greatest effect on boosting the response rates to surveys and questionnaires (Hartley & Rutherford, 2003). The differentiation in ceiling height and wall color was related to the higher levels of cooperative behavior among preschool children (Read, Sugawara, & Brandt, 1999).

Approaches to Children's Behavior in Social Dilemmas

Social dilemmas can be characterized as collective action problems in which rational self-interested actors do not obtain the best collective (Pareto-optimal) outcome (Taylor, 1988; Taylor & Lanni, 1981). A social dilemma game is a purely imaginary idealization of a social interaction (Colman, 1982). Because of the complication and transience of perceiving and understanding a real social interaction, an increasing number of researchers have adopted the method of the experimental game, which basically involves three main elements: players, strategies, and payoffs.

Taking preschool children's cognitive abilities into account, the ultimatum and dictator games were selected as experimental stimuli. This is because these two games are easily understood economic games, compared with other games (e.g., prisoner's dilemma game, public good game, etc.).

The dictator game (DG) is a purely altruistic task in which a participant makes an anonymous allocation to a partner (i.e., a recipient) from an initial fund. It has been viewed as the good approximation of true sharing or sacrificial caring (Camerer, 2003). The participant is the active player who makes a decision as to how to allocate the pie, and the recipient is the passive player who can only accept.

The ultimatum game (UG) is a simple game in which two players have to agree on how to split a sum of money (Nowak, Page, & Sigmund, 2000). The offers proposed by the active players reflect both altruistic and strategic considerations, such as expectations of reflection (Forsythe, Horowitz, Savin, & Sefton, 1994). When the active player proposes a division of the

pie to the passive player, both players receive nothing if the recipient rejects (Bolton, Katok, & Zwick, 1998). The recipients have more power in the UG than they do in the DG. In laboratory studies, it was found that participants tended to offer significantly higher amounts in the UG than in the DG (Bolton et al., 1998; Camerer & Thaler, 1995).

In accordance with previous findings on home advantage and prosocial behavior, this study was undertaken to investigate the effects of physical environment (i.e., game location) on preschool children's social dilemma behavior. Therefore, it was hypothesized that children could cumulatively earn more from the ultimatum and dictator games (in terms of the ration allocated for themselves + the ration received from their partner) when playing on their own turf than when playing on others' turf.

Method

Participants

The participants for this study were 64 preschool children (32 girls and 32 boys) who were enrolled in a city kindergarten during the 2004–2005 school year. The age of children ranged from 4.42 years to 5.76 years ($M = 5.27$, $SD = .34$). They were from four different classes of the same kindergarten. Two of the four classes in this study were located in the third floor, whereas the other two were on the first floor. According to their teachers and caregivers, children from different floors have little chance to communicate with each other during school days.

At the time (June, 2006) that the data collection took place, all participants had been in their assigned classroom for almost a full academic year, which would presumably ensure that the children would see the facility and classroom as their own turf.

Setting

A total of 16 boy-boy dyads and 16 girl-girl dyads were formed in which one child was selected from the classroom of the first floor and the other from the third floor. A DG and an UG were to be played by each dyad in either a classroom of first floor or that of third floor.

Members of each dyad were asked to sit, face to face, at a table placed at a corner of the classroom to play the two games. On the both sides of the table there was a tray holding 10 plastic cookies, which served as players'

initial funds and could be traded for their favorite toys. The classroom was seen as other's classroom (other's turf) for visitors but one's own classroom (one's own turf) for the other child.

Procedure

A visitor was led individually to another classroom and told that he/she would play games with a boy/girl from that class. The first game played was the DG. Children were asked to separately allot the 10 cookies, and their partners had to accept what was offered.

Each player in the dyad was asked to play as an active participant and as a recipient simultaneously. That is, each player proposed offers at the same time and then received offers from his or her partner. Upon completing the game, each player, as a recipient, received a number of cookies provided by the partner and, as an active participant, kept a number of cookies after proposing an offer.

The second game was the UG. The process of the UG was almost the same as of that of the DG, except for the instruction that their partners could decline the share of offers they proposed. Each child also played as both active participant and recipient simultaneously.

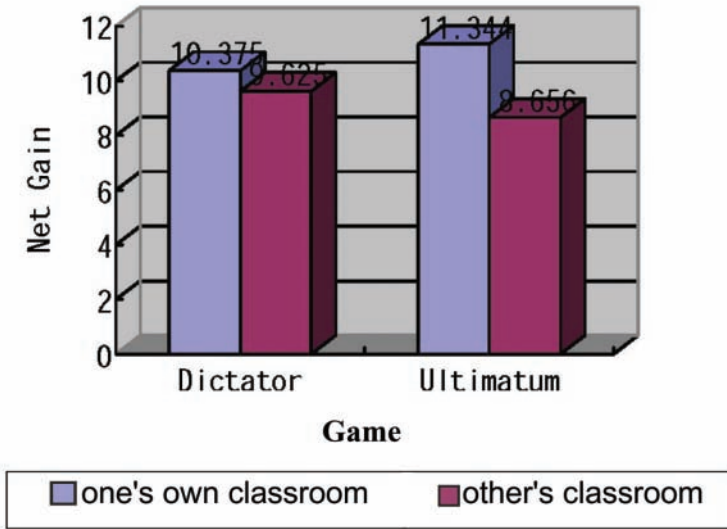
Considering that many children failed to understand the terms "accept, decline, agree, and disagree" (接受, 拒绝, 同意, 不同意) in the pilot study, the original instruction was thus modified by using somewhat understandable expression, "say yes" and "say no" (答应, 不答应), instead.

The experimental design was therefore 2 (turf: one's own classroom vs. other's classroom) \times 2 (gender: girl vs. boy) \times 2 (game: dictator vs. ultimatum, nested within participants) between-subjects repeated factorial. Upon completing the two games, participants were invited to trade cookies for a toy. The more cookies (left in hands + offers provided by other) they kept, the more likely they were to have a priority to trade for their favorite toy.

Results

Figure 1 presents the results of our experiment. For the purposes of data analysis, a variable called *net gain*, which was the sum of the cookies kept after giving to the partner and the cookies received from the partner, was calculated. The total number of cookies that participants had in the two roles (i.e., active participant and recipient) was used as an index of their advantage in decision making (the larger the number, the more the advantage).

Figure 1
Net Gain in Terms of Total Cookies (left in hands + offers provided by other) Kept by Preschool Children Who Have Played Two Games in Their Own and in Their Partner's Classroom



A 2 (turf) \times 2 (gender) \times 2 (game) repeated analysis of variance was conducted to test our hypothesis. The analysis revealed a significant main effect of turf, $F(1, 60) = 4.770, p < .05$, and a significant interaction effect of turf \times game, $F(1, 60) = 4.858, p < .05$. Other effects were not significant at the .05 level.

A closer look at Figure 1 indicates that these results support our hypothesis in that residents could benefit more in both games when approached in their own classrooms than when visitors approached in their partners' classrooms. In particular, residents provided fewer offers to and received more offers from their partners when approached in their own classrooms ($M = 11.34$) than when visitors approached in their partners' classrooms ($M = 8.66$) while playing the UG, $t(62) = 3.11, p < .01$, whereas children did not make a significant distinction between whether residents were approached in their own classrooms ($M = 10.38$) or visitors approached in their partners' classrooms ($M = 9.63$) while playing the DG, $t(62) = .823, p > .05$.

The data obtained suggested that the owner of a territory did enjoy an advantage over visitors, at least in the UG.

Furthermore, considering that the proposed offers in the DG and UG were commonly seen as the indices of participants' prosocial behavior (Bolton et al., 1998; Camerer & Thaler, 1995; Davis & Holt, 1993; Gallucci & Perugini, 2000; Henrich, 2006; Messick & McClintock, 1968), the proposed offers were also analyzed in detail. When looking at the proposed offers, a repeated measurement analysis of variance (ANOVA) revealed a significant effect of game, $F(1, 63) = 4.99, p < .05$, indicating that children provided fewer offers to their partners when playing DG ($M = 5.19$) than when playing UG ($M = 5.86$). An independent t test showed that residents provided significantly fewer offers to their visitors when approached in their own classrooms ($M = 5.19$) than when visitors approached in their partners' classrooms ($M = 6.53$) while playing the UG, $t(62) = 2.04, p < .05$, whereas the same observation (M own classroom = 5.00, and M partners' classroom = 5.38) failed to reach statistical significance when playing the DG, $t(62) = .56, p > .05$. The gender difference in proposed offers in the two games was not significant at .05 level, either. These results suggested that residents would display lower degrees of prosocial behavior on their own turfs than did visitors on partners' turfs.

General Discussion and Conclusions

This study attempted to examine the role that home advantage played in preschool children's performance during social dilemmas. Data collected from a kindergarten showed that the owner of a territory did enjoy an advantage over visitors in the sense that children playing in their own classrooms enjoyed a net gain from games compared with those played in their partners' classrooms. These findings extend our knowledge of the prior-residence effect from the animal kingdom to the realm of children's performance in social dilemmas.

In others' territory, on the contrary, visitors provided more offers to their residents in both ultimatum and dictator games, although the finding failed to reach statistical significance in the latter, indicating that visitors displayed a higher degree of prosocial behavior. There were several potential mechanisms for inducing prosocial behavior, such as degree of brief (i.e., trusting or suspicious; Hashimoto, 1987), coefficient of morality k (Sheng, 1994), empathy (Iannotti, 1985), perspective taking (Gagné, 2003; George, 1990; Iannotti, 1985), mimicry (Van baaren, Holland, Kawakami, & Van

Knippenberg, 2004), and many more. Our results therefore provided another potential mechanism to explain the revealed prosocial behavior. That is, the prosocial behavior, in terms of game offers provided, was interestingly induced by the player being at a disadvantage.

In the present research, the proposed effect of being at a disadvantage is twofold. The first reason deals with the disadvantages of being on another's turf, which has been demonstrated in numerous studies on animals and with human sports (Harris & McAndrew, 1986; Marcus & Francis, 1995; Rapoport, 1977, 2000; Sommer, 1969). The second is being at a disadvantage when the recipient has the right to say no. The passive players have no rights to say no and have no influence on the results in the DG (Henrich, 2006). Recipients' having a right to say no in the UG, in turn, will place the other player in an inferior position, thus presumably leading to prosocial behavior. Kahneman, Knetsch, and Thaler (1986) found that the participants provided more offers in UGs than in DGs, and they tended to be significantly more selfish in DGs. Falk, Fehr, and Fischbacher (2003) also reported that as soon as the passive players could accept or decline what was offered, the active player chose more offers for partners to show their friendliness and cooperation. It is commonly accepted that the DG is a purely altruistic game without danger of being rejected, whereas the ultimatum game is an altruistic, fair, reciprocal, and strategic game (Forsythe et al., 1994; Kahneman et al., 1986; Suleiman, 1996; Handgraaf, Van Dijk, & De Cremer, 2003). Van Dijk and Vermunt (2002) suggested that UGs evoked a strategic motivation and DGs evoked a concern for fairness. It was their conjecture that sometimes a player was better off being "powerless" (i.e., being a recipient in a dictator game) than being "powerful" (i.e., being a recipient in an ultimatum game). Our results add further evidence that children provided more offers to their partners in the UG than in the DG. A possible explanation was that the participants perceived less necessity of being fair when there was no danger of being rejected (Hoffman & Spitzer, 1985). We conceived, further, that a player would propose more offers in a brand new game in which the recipient has even more rights to say no. It would be of great interest to design and test such a new "ultimatum" game in future study.

It is worth noting that it is commonly assumed that girls are more helpful, generous, or compassionate than boys. Research (e.g., Eisenberg & Fabes, 1998) suggested, however, that there was no evidence for gender differences in prosocial behavior in either laboratory or field studies. This study adds to the growing body of evidence that girls are not more altruistic than boys.

It is also worth noting that our participants were children who ranged in age from 4.42 years to 5.76 years. There is plenty of evidence that older children display more prosocial behavior than younger ones (e.g., Denham, 1986; Eisenberg et al., 1998, 2006; MacDonald, 1988; Penner, Dovidio, Piliavin, & Schroeder, 2005; Radke-Yarrow, Zahn-Waxler, & Chapman, 1983). In a meta-analysis of age-related change in prosocial behavior, Eisenberg and Fabes (1998) found increases in prosocial behavior when comparing preschoolers with either childhood or adolescent age groups, whereas no differences were seen between infancy and preschool periods. It was therefore reasoned that when the effect of being at a disadvantage was detected by using children, rather than adult subjects, a further implication for the effect was that, the underlying mechanism of prosocial behavior should be more primary, compared with those developed in school years or later as a result of socialization.

In summary, the present research suggests a prior-residence effect in preschool children's prosocial behavior. It was found that the owner of a territory did enjoy an advantage over visitors. On another's turf, visitors turned out to be more prosocial. Such a tendency to be prosocial was attributed either to the disadvantage of not being on one's own turf or to the disadvantage of not being empowered to dictate terms. The disadvantage was then considered as a somewhat primary mechanism, compared with other mechanisms in the literature on cognitive and moral development and socialization. To test the assumption of the effect of being at a disadvantage experimentally, the present exploration provides us with new directions for further research.

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