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Original Article

Wealth-dependent and interdependent strategies in the Saami reindeer husbandry, Norway

Marius Warg Næss[a,b,*], Bård-Jørgen Bårdsen[b], Torkild Tveraa[b]

[a]CICERO-Center for International Climate and Environmental Research, Fram Centre, N-9296 Tromsø, Norway
[b]Norwegian Institute for Nature Research (NINA), Arctic Ecology Department, Fram Centre, N-9296 Tromsø, Norway

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Abstract

It has been argued that decisions in relation to choosing strategies to a large degree depend on an organism's state. For nomadic pastoralists, wealth is an important state variable since it has been argued that differences in observed behaviours reflect alternative strategies dependent on varying socioeconomic circumstances. From a game theoretical point of view, however, strategies are also interdependent, i.e., the choice of a strategy cannot be made wisely without considering what other actors are doing since the outcome of a given strategy is dependent not only on individual state but also on the strategies of others. This study investigated to what degree slaughter strategies in the Saami reindeer husbandry are both state dependent and interdependent. The main findings in this study were that (a) the probability, (b) the amount, and (c) the type of animal slaughtered to a large degree were influenced by both individual herders' herd size and the number of animals slaughtered by neighbouring herders. Moreover, this study also found that kinship represents a coordinating principle since the degree of genealogical relatedness had a positive effect on the slaughtering strategies adopted by herders.

Keywords: Tragedy of the commons; Prisoners' Dilemma; Cooperation; Management; Reindeer abundance; Common pool resources

1. Introduction

1.1. State-dependent strategies

It has been argued that decisions in relation to choosing strategies to a large degree depend on the organism's state (e.g., McNamara & Houston, 1996), and for nomadic pastoralists, some measure of wealth (e.g., herd size) may be an important state variable. Differences in observed behaviours among nomadic pastoralist may, for example, reflect alternative strategies aimed at achieving similar objectives dependent on varying socioeconomic circumstances (Borgerhoff Mulder & Sellen, 1994). Grandin (1983:240), for example, argues that a herder with 400 animals has different options available than one with 4. In a model investigating how household wealth should be divided between small stock (i.e., goats) and large stock (i.e., camels) in order to maximise long-term household viability, Mace and Houston (1989) found that while it paid off for relatively poor pastoral households to maximize goats, this changed above a certain threshold of wealth where it paid off to invest in camels. In another study, Mace (1993) found that wealthier pastoralists use flexible herd management strategies to accommodate long-term household survival by controlling breeding rates of sheep. This practice can be explained by the cost of reproduction, especially during occasions of harsh weather conditions where the survival rate of neonates and even pregnant and/or lactating females can be substantially lowered (Bårdsen et al., 2010; Bårdsen and Tveraa, 2012; Tveraa et al., 2003; Bårdsen et al., 2011). Poor households cannot engage in this practice since they have no choice but to increase herd size. Moreover, Borgerhoff Mulder and Sellen (1994:214) argue that rich herders among the Kipsigis and Datoga often extend livestock as gifts to clansmen or neighbours having an emergency. While this practice reduces wealthy households' short-term access to livestock and livestock products, it may increase long-term household survival through delayed reciprocity, a strategy that is only available to wealthier

* Corresponding author. CICERO-Center for International Climate and Environmental Research, Fram Centre, N-9296 Tromsø, Norway. Tel.: +47 77750133.
E-mail address: m.w.nass@cicero.uio.no (M.W. Næss).

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households (Borgerhoff Mulder & Sellen, 1994:214; see also Moritz et al., 2011). Grandin (1983:241–2) has presented evidence that indicate that, in Kenya, percentage offtake is negatively related to wealth, but that wealthy households have greater per capita slaughter. In other words, wealthy households slaughter a larger number of animals but proportionally less of their herds than poor households.

1.2. Interdependent strategies

While wealth seems to be an important state variable affecting production strategies in several pastoral societies, decisions in relation to, for example, the number of animals to slaughter also have to be made in relation to the actions of neighbouring herders because the outcome of a given strategy is dependent not only on the herders' own state but also on what others are doing (Schelling, 1980; see also Axelrod, 1984; Colman, 1995; Dixit & Skeath, 2004; Wydick, 2008). In general terms, this interdependency lies on a continuum with pure coordination at one end (convergent interests) and pure conflict at the other end (divergent interests, Schelling, 1980).

1.2.1. Mixed motives: Prisoners' Dilemma and the tragedy of the commons

Nevertheless, most situations lie somewhere in between these two extremes where individuals are faced with incentives both to cooperate and to compete. A case in point is Hardin's (1968) concept of 'the tragedy of the commons' since it captures the social dilemma inherent in utilizing communally owned resources: all herders would be better off by cooperating to restrict herd size and consequently preserve the common grazing area, but individuals can do better by taking advantage of the cooperative efforts of others.

The tragedy of the commons is an example of a Prisoners' Dilemma, and Hardin (1968) observed that Prisoners' Dilemma problems occur in many, if not most, situations that call for some kind of collective sacrificial restraint or action, but where *the underlying incentive lies in gaining and individual advantage through a lack of individual restraint* (Wydick, 2008:27–8). In short, the Prisoners' Dilemma captures a broad class of settings in which the welfare of the individual and the welfare of the group are in conflict (Wydick, 2008). Thus, decisions in relation to the number of animals to slaughter also have to be made in relation to the actions of other herders. This is especially pertinent in areas with common pastures, e.g., the reindeer husbandry in Finnmark, where access to pastures is to a large degree dependent on herd size (Riseth, Johansen, & Vatn, 2004). Larger herds use more extensive pasture areas and may thereby exclude other herds from grazing in the same area. In such a system, a unilateral strategy of slaughtering many animals has negative implications if *everybody else slaughters few or no animals*. In other words, in areas where pastures are common, decisions in relation to slaughter can be expressed as a tragedy of the commons: individuals perform better by adding additional animals on the common pastures since the cost of overexploitation is shared by all users while the benefits of increased herd size are accrued to individual herders (Næss and Bårdsen, 2010). One way of achieving such a benefit is to restrict slaughter.

1.2.2. Kinship—evolutionary aspects of cooperation

In general terms, benefits not easily obtainable by individuals may be available to cooperating groups (Axelrod, 1984). The problem, as illustrated by the tragedy of the commons, is related to "free riding" where individuals that can benefit from cooperation can do better by exploiting the cooperative behaviour of others (Axelrod, 1984).

From an evolutionary point of view, important mechanisms facilitating cooperative behaviour are kin selection and inclusive fitness (e.g., Alvard, 2003;Hamilton, 1964; for a review, see Griffin & West, 2002). Other prominent mechanisms facilitating cooperation are (a) reciprocity (Trivers, 1971), (b) signalling (Smith & Bird, 2005), and (c) punishment (Axelrod, 1986). Moreover, (d) asymmetry in social relations has been argued to play a part in the emergence of cooperative social institutions (Richerson, Boyd, & Henrich, 2003; see also Borgerhoff Mulder & Coppolillo, 2005), where some individuals have both the means and the incentives to enforce, e.g., costly punishment that facilitate cooperative behaviour. Punishment, however, represent a second-order collective action problem because the means to solve a collective action problem itself poses a collective action problem since punishment is a public good open for free riding (see Smith, 2003). More to the point, while punishment may favour cooperation, it is less evident why natural selection would favour such a trait (West, El Mouden, & Gardner, 2011). Nevertheless, experimental evidence indicates that, in the long run, both groups and individuals are better off when punishing noncooperative behaviour since the cost of punishment becomes negligible and is also outweighed by the increased benefits that comes from cooperation (Gachter, Renner, & Sefton, 2008). Moreover, punishment may provide (a) direct fitness advantages by seceding interactions with uncooperative individuals to the benefit of interactions with cooperative individuals and (b) indirect fitness advantages as punished individuals may change behaviour in response to punishment and may thus be more likely to cooperate in the future (cf. West et al., 2011).

Kin relations may thus provide a powerful coordinating principle (Hamilton, 1964; Griffin & West, 2002; Alvard, 2003; Smith, 2003; Gintis, Bowles, Boyd, & Fehr, 2005) because groups organized on the basis of kinship are usually small where individuals have (a) close and long-term contact and (b) the possibility to monitor the behaviour of others with the possibility to (c) punish people who break the rules (Borgerhoff Mulder & Coppolillo, 2005, see below for arguments in relation to why reciprocity, kinship, and punishment may not explain large-scale cooperation). Kin relationship may thus be conducive for making it possible for herders to monitor and punish rule breakers and thus mitigate the inherent social dilemma in utilizing common pool resources.