

Symbols and cooperation

Tom Potoms *

ECARES, Université Libre de Bruxelles, Brussels, Belgium

and

Tom Truyts[†]

CEREC, Université Saint-Louis - Bruxelles, Brussels, Belgium

Extended abstract

Groups typically use various kinds of symbols to underline their group identity. The minimal group experiments of Tajfel and Turner (1979) show that people are more inclined to cooperate with others who bear the same markers. We study how such symbols facilitate cooperation in dynamic setting, in which players are randomly paired to a possible partner to play a local public good game.

Iannaccone (1992) and Berman (2000) study the role of symbols in fostering cooperation in sects and cults: if members have to contribute time to the local public good, then a cult or sect can require its members to wear particular clothing, speak a deviating language and respect some dietary restrictions. If these restrictions make it more difficult for group members to maintain social relations with non-members, then group members are more likely to contribute more time to the group. Note, however, that this mechanism rests on non-group members being less inclined to maintain relations with group members obeying these group restrictions, which is exogenously imposed in these papers. We endogenously derive out-group members' reactions to group symbols in the context of an infinitely repeated public good game with random matching and endogenous continuation of partnerships. As such, our model closely relates to Ghosh and Ray (1996), Kranton (1996), Eeckhout (2006) and more generally to literature on folk type theorems with random matching (and limited information processing), e.g. Kandori (1992), Fujiwara-Greve and Okuno-Fujiwara (2009), Fujiwara-Greve et al. (2013), Suzuki (2013). Eeckhout (2006) studies how payoff-irrelevant markers (e.g. ethnicity) can function as a public correlation device, which can support

*E-mail: Tom.Potoms@ulb.ac.be

[†]E-mail: Tom.Truyts@usaintlouis.be

a segregation equilibrium in which players only cooperate with same-marker type individuals, and shows that these kind of equilibria can Pareto dominate color-blind equilibria. Color-blind equilibria employ incubation-type strategies. In these equilibria, new partners defect first for a sufficient number of periods. The threat of terminating partnership, and having to start anew with defection stage, suffices to ensure that cooperation in later stages of the partnership is incentive compatible. Eeckhout shows that a marker-dependent equilibrium, in which new partners bearing the same marker start cooperating immediately while other new partners play the incubation strategy Pareto dominates the color-blind equilibrium as it reduces the expensive incubation stage. Eeckhout shows then that, for non-uniformly distributed marker-types the minority type individuals are worse-off to majority type players in a segregation equilibrium. In absence of symbols, but with incomplete information on time preferences, Ghosh and Ray (1996) characterize cooperative equilibria in an infinitely repeated public good game. These equilibria satisfy a refinement, coined bilateral rationality, which excludes joint incentive compatible deviations by current partners. As in Ghosh and Ray, we study equilibria satisfying bilateral rationality in an infinitely repeated public goods game. As in Eeckhout, we are particularly interested in segregation equilibria of this game, based on publicly visible symbols, but we allow for players to endogenously choose their symbol. Specifically, each stage game consists of two periods:

- Public goods game: play public good game with current partner.
- Symbols and partnerships: partnerships can be terminated after observing stage payoffs of the public good game. Partnerships are ended exogenously with small probability. And after ending a partnership a new partner is drawn from players who saw their partnership terminated. Players can change their symbol at a given cost.

We show that symbol-neutral equilibria generically do not exist and characterize conditions on the technology of the public good game for the existence of a stationary perfect Nash equilibrium in which players only wish to form partnerships with other bearing the same symbol and refuse to cooperate with players with a different symbol. We show, contrary to Eeckhout that players with a less frequent symbol succeed in sustaining higher levels of cooperation and payoffs. This equilibrium can be sustained because players with a less frequent symbol have to wait longer in expectation to find a new partner with the same symbol, if their present partnership is ended. This gives such partners worse

outside option, and hence a higher cost of breakup, allowing them to support a higher level of cooperation. We show that Eeckhout's special case of symmetrically distributed symbols is obtained in the limit for the symbol switching cost approaching zero.

We further extend the symbol choice problem to study some current questions about cultural diversity and polarization. For example: when do we observe radicalization into small minorities with high dedication to their group? What if players can choose how costly their symbol is? When do we observe a convergence to small groups with high cooperation, and when does a unique optimal group size exist (with group size denoting the frequency of a symbol in the population). What if players with two out of multiple symbols cooperate (as if both symbols are the same) in peaceful coexistence at a moderate level of cooperation? Can a subset of those players deviate to a small symbol-homogenous high cooperation group? And is such radicalization reversible? And finally, group identity is a multidimensional concept, and the most salient societal cleavages often change throughout time (e.g. class vs ethnicity or culture). We study in a 4 symbol setting (e.g. a high class blue, high class red, lower class blue and lower class red symbol), in which players cooperate either over the class or color boundaries, and study how to shift from a class-cleavage to a color-cleavage equilibrium.

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