Journal of Conflict Resolution

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Journal of Conflict Resolution 2006 50: 926
DOI: 10.1177/0022002706293470

The online version of this article can be found at:
http://jcr.sagepub.com/content/50/6/926

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On behalf of:

Peace Science Society (International)

The Evolution of Ethnocentrism

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Ethnocentrism is a nearly universal syndrome of attitudes and behaviors, typically including in-group favoritism. Empirical evidence suggests that a predisposition to favor in-groups can be easily triggered by even arbitrary group distinctions and that preferential cooperation within groups occurs even when it is individually costly. The authors study the emergence and robustness of ethnocentric behaviors of in-group favoritism, using an agent-based evolutionary model. They show that such behaviors can become widespread under a broad range of conditions and can support very high levels of cooperation, even in one-move prisoner's dilemma games. When cooperation is especially costly to individuals, the authors show how ethnocentrism itself can be necessary to sustain cooperation.

Keywords: *in-group favoritism; ethnocentrism; agent-based models; evolutionary models; contingent cooperation*

Ethnocentrism is a nearly universal syndrome of discriminatory attitudes and behaviors (Sumner 1906; LeVine and Campbell 1972). The attitudes include seeing one's own group (the in-group) as virtuous and superior, one's own standards of value as universal, and out-groups as contemptible and inferior. Behaviors associated with ethnocentrism include cooperative relations within the group and the absence of cooperative relations with out-groups (LeVine and Campbell 1972). Ethnocentric behaviors are based on group boundaries that are typically defined by one or more observable characteristics (such as language, accent, physical features, or religion) regarded as

AUTHORS' NOTE: We thank Michael D. Cohen, Alan Grafen, John Holland, Richard Lenski, Scott Page, Carl Simon, Rick Riolo, Mercedes Pascual, Hans Christian Siller, Lars-Erik Cederman, J. M. G. van der Dennen, David Lazer, Robert Putnam, and Tarah M. Wheeler. For financial help, we thank the Intel Corporation, the National Science Foundation, and the Literature Science and Arts Enrichment Fund of the University of Michigan. To download the JAVA source code used to generate the data in this article, see http://umich.edu/~axe/Shared_Files/Axelrod.Hammond/index.htm. An independent validated replication of this model is available in NetLogo. To run the NetLogo version and see its source code, see http://ccl.northwestern.edu/netlogo/models/Ethnocentrism. Data files for this study are available at http://jcr.sagepub.com/cgi/content/full/50/6/926/DC1/. In addition, a QuickTime animation of a typical run is currently available at umich.edu/~axe/vtmovie.htm.

JOURNAL OF CONFLICT RESOLUTION, Vol. 50 No. 6, December 2006 926-936
DOI: 10.1177/0022002706293470

indicating common descent (Sumner 1906; Hirschfeld 1996; Kurzban, Tooby, and Cosmides 2001). Such behaviors often also have a strong territorial component (Sumner 1906). Ethnocentrism has been implicated not only in ethnic conflict (Brewer 1979; Chirot and Seligman 2001), instability of democratic institutions (Rabushka and Shepsle 1972), and war (van der Dennen 1995) but also in consumer choice (Klein and Ettenson 1999) and voting (Kinder 1998). Although ethnocentrism is sometimes used to refer to a wide range of discriminatory behaviors, we will focus on ethnocentric behavior defined as in-group favoritism. This definition is consistent with research in anthropology and psychology that differentiates, both empirically and causally, between in-group favoritism ("ethnocentrism") and out-group hostility ("xenophobia") (Ray and Lovejoy 1986; Struch and Schwartz 1989; Cashdan 2001; Hewstone, Rubin, and Willis 2002; Brown 2004).

Ethnocentrism is generally thought to involve substantial cognitive ability in individuals (Sumner 1906; Simmel 1955; Sherif and Sherif 1956; Sherif 1966; LeVine and Campbell 1972; Hewstone, Rubin, and Willis 2002) and to be based on complex social and cultural inputs. While such factors certainly play a role in much ethnocentric behavior, extensive empirical evidence from psychology suggests the prevalence of a strong individual *predisposition* toward bias in favor of in-groups, which can be observed even when cognition is minimal and social input very abstract. Laboratory results, for example, suggest that behaviors of in-group favoritism can be easily triggered by even the most trivial and arbitrary group definitions (Tajfel 1970; Tajfel et al. 1971). Behaviors favoring in-groups are also found to be widespread even when they are individually costly and even in the absence of opportunities for reciprocity or direct self-interested gain (Ferguson and Kelley 1964; Kramer and Brewer 1984; Brewer and Kramer 1986). Studies in cognitive psychology find that categorization and discrimination based on group boundaries is often rapid and even preconscious (Dovidio and Gaertner 1993; Lamont and Molnar 2002).

In this article, we explore the emergence and robustness of a behavioral tendency toward in-group favoritism among individuals with minimal cognitive ability and bounded rationality. Since this well-documented predisposition requires little cognition and transcends any specific social context, an evolutionary model focused on the fundamental dynamics of in-group favoritism can be useful. Our model is abstract and is not intended as a realistic portrayal of specific social behaviors, and the evolutionary framework we use is an approach that has proven useful for studying adaptation in general (Boyd and Richerson 1985; Axelrod 1986; Nowak and Sigmund 1998; Riolo, Cohen, and Axelrod 2001). Recent evidence also suggests that an evolutionary approach may be appropriate as more than a modeling convenience. In political science, current research suggests that a number of political beliefs and behaviors may be influenced by heritable tendencies that are selected for evolution (Alford, Funk, and Hibbing 2005). The existence of broad and potentially heritable universals of the human mind has long been accepted in the study of psychology, and in anthropology as well there is increasing focus on universals of human thinking that result from evolution and are believed to leave the human mind "prepared to think" in a particular fashion and "predisposed" to react in certain ways (Brown 2004; Wrangham 2004). In-group bias (of the type we are studying here) is often included in the list of observed innate universal predispositions, and some anthropologists argue that nationalisms and racisms observed today are likely "hypertrophies of an ethnocentrism that for many millennia played itself out on a much smaller scale" (Brown 2004).

To isolate fundamentals of in-group favoritism, we want an evolutionary model of cooperation and competition that is as simple as possible.[1] Fortunately, we can use a model that we previously developed to study the evolution of altruism in biological settings (Hammond and Axelrod 2006). Instead of interpreting similarity of individuals as based on considerations observable even by microorganisms, such as cell surface structure or pheromones, we interpret similarity here as being based on observable characteristics that people may find socially relevant (such as skin color or language).

It is important to note that the evolution of a predisposition to favor in-groups is not necessarily predictive of observed behavior—such predispositions can be trumped by more complex reasoning (Kurzban, Tooby, and Cosmides 2001). In addition, what counts as membership in an in-group is continually shaped by culture. Our model does not explore which traits (i.e., attributes) are mobilized to assess in-group membership. Instead, we employ a single, abstract trait to study the emergence of in-group bias in its simplest form. We define group membership as the possession of a specific "color" of this single observable, heritable trait (or "tag"). Those individuals in the model who share one's color are one's "in-group."

We show that ethnocentric behavior can emerge from our model of local competition between individuals, without any explicit difference between the evolutionary process for dealing with members of one's own group and the evolutionary process for dealing with members of other groups. The dominance of ethnocentrism is surprisingly robust to a wide range of changes in the parameters and structure of the model. We also show that ethnocentrism can support contingent cooperation in the form of in-group favoritism without requiring mechanisms such as reciprocity (Axelrod and Hamilton 1981), reputation (Nowak and Sigmund 1998), conformity (Boyd and Richerson 1985; Simon 1990), or leadership (Roosens 1989). The model we use is distinctive among models of in-group behavior in treating discrimination as just one of a range of possible outcomes and in requiring only minimal cognitive ability in individuals. In this way, we are able to study how and why a predisposition toward in-groups may have evolved. Because the model requires individual heterogeneity (of traits), as well as contingent behaviors that coevolve with the traits on which they are based, the model is not mathematically tractable. Therefore, we use an agent-based simulation technique, detailed below.

THE MODEL

In our model, we will operationalize in-group favoritism as preferential cooperation with in-groups and noncooperation with out-groups. To make cooperation individually costly, we use a prisoner's dilemma framework. To remove any opportunity

1. Our goal is a model that is as simple as possible while producing results that are qualitatively consistent with known facts. For a formal typology of empirical relevance in agent-based models, see Axtell (forthcoming).

for direct reciprocity, we use a one-move prisoner's dilemma rather than the iterated variant. To incorporate important aspects of territoriality, we make both interaction and the propagation of strategies strictly local in a two-dimensional space. Finally, to introduce group differences and allow discrimination based on them, we give each agent three traits. The first trait is a tag that specifies its group membership as one of four predefined colors. The second and third traits specify the agent's strategy. The second trait specifies whether the agent cooperates or defects when meeting someone of its own color. The third trait specifies whether the agent cooperates or defects when meeting an agent of a *different* color. In our interpretation, the "ethnocentric" strategy of in-group favoritism is simply cooperation with an agent of one's own color and defection with others. Thus, the ethnocentric strategy is only one of the four possible strategies. Since the tags and strategies are not linked (and only tags are observable), the model allows for the possibility of "cheaters" who free ride on the donations of same-color ethnocentrics while themselves providing help to no one at all.

The simulation begins with an empty space of 50 × 50 sites. The space is toroidal, meaning that it has wraparound borders so that every site has exactly four neighboring sites. Each time period consists of four stages: immigration, interaction, reproduction, and death.

1. An immigrant with random traits enters at a random empty site.
2. Each agent has its potential to reproduce (PTR) set to 12 percent. Each pair of neighbors then interacts in a one-move prisoner's dilemma in which each chooses (independently) whether to help the other. Giving help has a cost—namely, a decrease in the agent's PTR by 1 percent. Receiving help has a benefit—namely, an increase in the agent's PTR by 3 percent.
3. Each agent is chosen in a random order and given a chance to reproduce with probability equal to its PTR. Reproduction consists of creating an offspring in an adjacent empty site, if there is one.[2] An offspring receives the traits of its parent, with a mutation rate of 0.5 percent per trait.
4. Each agent has a 10 percent chance of dying, making room for future offspring.

For a more formal statement of the model, see the appendix.

RESULTS

The main result of the simulation is that the ethnocentric strategy becomes common even though, unlike previous models,[3] favoritism toward similar others is not built into the model. In the final 100 periods of ten 2,000-period runs, 76 percent of the agents have the ethnocentric strategy, compared to 25 percent if selection had been neutral (Table 1, row a). This result shows that in-group favoritism based on

2. Sexual reproduction is certainly interesting, but to keep the model as simple as possible, we do not include it here. Incidentally, the mode of reproduction used in the model is more appropriate for an interpretation of agents as individuals than as groups. However, one could study group-level questions by studying sets of agents.

3. Examples include Hamilton (1964), Lacy and Sherman (1983), and Riolo, Cohen, and Axelrod (2001).

TABLE 1
Ethnocentrism over a Range of Parameters

	Percent Ethnocentric Strategy	*Percent Cooperative Behavior*
a. Standard case	76.3 ± 0.9	74.2 ± 0.5
b. Cost: 0.5	76.0 ± 1.4	77.8 ± 0.7
c. Cost: 2	61.8 ± 2.1	56.1 ± 1.2
d. Colors: 2	69.4 ± 1.3	78.1 ± 0.5
e. Colors: 8	79.1 ± 0.9	71.7 ± 0.5
f. Mutation rate: 0.25 percent	82.8 ± 1.3	79.8 ± 0.5
g. Mutation rate: 1 percent	67.1 ± 0.9	69.0 ± 0.6
h. Immigration rate: 0.5	77.5 ± 0.5	75.5 ± 0.7
i. Immigration rate: 2	74.4 ± 0.8	71.4 ± 0.9
j. Lattice size: 25 × 25	70.5 ± 2.2	69.9 ± 1.2
k. Lattice size: 100 × 100	78.2 ± 0.8	76.0 ± 0.3
l. Run length: 500	73.9 ± 1.0	73.4 ± 1.0
m. Run length: 2,000	77.3 ± 1.0	74.4 ± 0.5

NOTE: The ethnocentric strategy prevails even when the parameters of the standard case are halved or doubled. The standard parameters are as follows: 1 percent as the cost of giving help, four colors of tags, 0.5 percent mutation rate per trait, one immigrant per time period, 50 × 50 lattice size, and 2,000 periods per run. Data are averaged over the last 100 periods. The range shown is plus or minus the standard error based on ten runs. Although none of the variants shown in the table affect the basic result (the predominance of ethnocentrism and cooperation), it is interesting to note how each parameter change affects the results. The higher the cost (b, a, c), the less ethnocentrism because cooperating with same-color "cheaters" bears an increasing penalty. The more colors (d, a, e), the more ethnocentrism because tags become increasingly accurate indicators of relatedness, and this makes discrimination more effective. The more "randomness" via immigration and mutation (f, a, g, and h, a, i), the less ethnocentrism because tags become less accurate indicators of relatedness, which makes discrimination less effective.

simple tags and local interactions can overcome egoism and dominate a population even in the absence of reciprocity and reputation and even when "cheaters" need to be suppressed. Not only is ethnocentrism the dominant strategy, but cooperation (donation) is also the dominant behavioral choice: fully 74 percent of interactions are cooperative (Table 1, row a). Cooperation is common because the dominance of ethnocentric strategies is combined with a tendency for neighbors to have the same tag.

The emergence and dominance of the ethnocentric strategy is not a "knife-edge" phenomenon. In fact, its dominance is robust under a wide range of parameters and variations in the model. When any of the following parameters are either halved or doubled, at least two-thirds of strategies are ethnocentric: cost of helping, lattice width, number of groups, immigration rate, mutation rate, and duration of the run (see the sensitivity analysis in Table 1). The ethnocentric strategy becomes just as dominant even when the simulation starts with a full lattice consisting only of egoists, and no immigration is allowed. Another check for robustness is a variant of the model in which an agent can distinguish all four colors, rather than just distinguishing between its own color and all other colors. Again, the results are very similar, with 80 percent ethnocentric strategies. Surprisingly, the results are also not very sensitive to the possibility that an agent will occasionally misperceive whether the

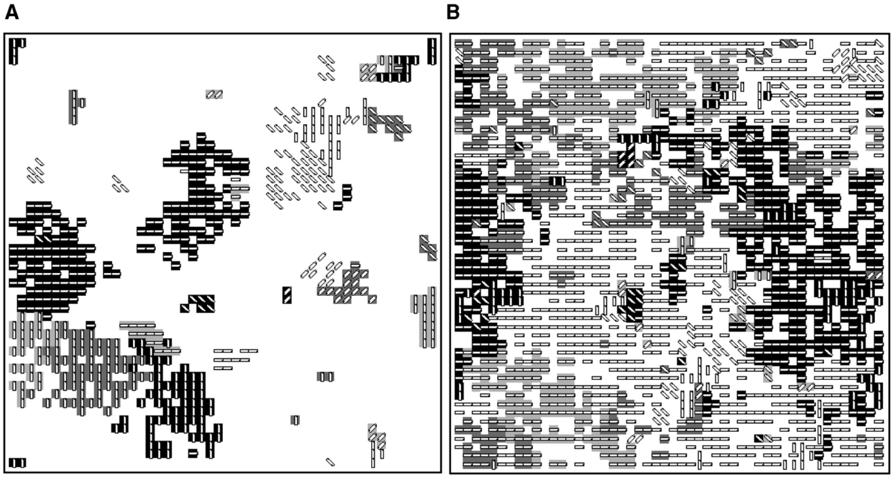

Figure 1: A Sample Model Run after (a) 100 Periods and (b) 2,000 Periods

NOTE: The run shown here uses a lower mutation rate (Table 1, row f) to make the regions easier to distinguish visually. The four tag types (colors) are represented as shades of grey. Ethnocentric agents are represented by horizontal lines. Pure cooperators are represented by vertical lines. Egoists are represented by diagonal lines sloping upward to the right. Finally, the strategy of donating only to dissimilar others is represented by diagonal lines sloping downward to the right. A color movie of a typical run (with standard parameters) is available at umich.edu/~axe/vtmovie.htm.

other agent in the interaction has the same color. Even when agents make this mistake 10 percent of the time, the population evolves to be more than two-thirds ethnocentric. This resistance of in-group favoritism to noise is quite a contrast to studies of reciprocity in the iterated prisoner's dilemma. The tit-for-tat strategy, for example, requires the addition of generosity or contrition to be effective in the face of even rare misperceptions (Molander 1985; Wu and Axelrod 1995).

Examining the dynamics of the model reveals how the ethnocentric strategy becomes so common and how "cheaters" are suppressed by ethnocentrics of a different color. In the early periods of a run, the scattered immigrants create regions of similar agents (Figure 1a). Colonies of those willing to cooperate with their own color will tend to grow faster, but over time, they face free riding by egoists who arise by mutation. Egoists who free ride cannot be suppressed by ethnocentrics of the same color and therefore tend to erode cooperative regions. Once the space is nearly full, another dynamic is added as regions with different attributes expand until they are adjacent to each other. These dynamics can be analyzed in terms of regions of contiguous agents having the same color and strategy (Figure 1b). The most important aspect of regional dynamics is that an ethnocentric region will tend to expand at the expense of a region of a different color using any one of the other three strategies (Figure 2). In this way, free riding is controlled—egoists of any one color are suppressed by ethnocentric agents of different colors.

Figure 2: An Ethnocentric Region Dominates a Region of Egoists of a Different Color
NOTE: This schematic diagram represents what can happen at the boundary of a region of red ethnocentric agents (on the left) and a region of blue egoists who cooperate with no one (on the right). When a red ethnocentric agent interacts with a blue egoist, neither cooperates so neither does well, as signified by the thin line between them. When this red ethnocentric agent interacts with its red ethnocentric neighbors, both cooperate and both do well, as signified by the thick lines between them. The blue egoist does not do as well when it interacts with blue egoists from its own region because egoists do not cooperate with each other. Overall, then, the red ethnocentric does better than the neighboring blue egoist does, by receiving "help from behind" from its own region. Since doing better translates into a greater potential to reproduce, the red ethnocentric region will tend to grow at the expense of the blue egoist region. More generally, an ethnocentric region of any color will tend to expand at the expense of adjacent regions of egoists of a different color. Thus, "cheaters" of a given color are suppressed by the ethnocentrics of the other colors.

A remarkable result is that the ability to discriminate between the in-group and the out-groups can actually promote cooperation. As long as agents can distinguish their own color from other colors, even doubling the cost of cooperation sustains a cooperation level of 56 percent. However, when agents are unable to distinguish their own color from others, cooperation in the doubled-cost case falls to 14 percent. Therefore, as the cost of giving help increases, the ability to distinguish between in-group and out-group members can be essential for the maintenance of cooperation in "austere" environments. In fact, the ability to distinguish between groups can be regarded as a basis for social capital within a group (Coleman 1990; Putnam 2000).

CONCLUSIONS

Our results show that in-group favoritism can be an undemanding yet powerful mechanism for supporting high levels of individually costly cooperation with only minimal cognitive requirements and in the absence of other, more complex mechanisms.[4] This finding helps to explain how the observed predisposition toward

4. The established mechanisms to support cooperation include (1) central authority, typically a state or empire (Hobbes [1651] 1992; Tilly 1992); (2) inclusive fitness based on kinship (Hamilton 1964; Dawkins 1989); (3) barter and markets (Smith [1776] 1994; Samuelson 1947); (4) principal-agent mechanisms, including employment (Spence and Zeckhauser 1971); (5) reciprocity based on continuing interaction (Trivers 1971; Axelrod 1984); (6) decentralized enforcement, including norms (Axelrod 1986; Hechter and Opp 2001), informal institutions (Ostrom 1998), trust (Hardin 2002), and the more inclusive mechanism of social capital (Coleman 1990; Putnam 2000); (7) group selection (Sober and Wilson 1998); (8) docility (Simon 1990); and (9) reputation (Nowak and Sigmund 1998). For theoretically based classifications, see Lichbach (1996) and Lehmann and Keller (2006).

in-group favoritism might have evolved and why such a predisposition might be easily triggered in situations where other social mechanisms for cooperation (institutions, reciprocity, etc.) are absent. Such a mechanism may have been derived from kin recognition systems or may have arisen separately. The model presented here does not study the process by which specific traits become salient in defining group distinctions, although the emergence of a predisposition to favor in-groups helps to explain why manipulating such differences is often a powerful political strategy (as demonstrated in the early 1990s by Slobodan Milosevic). We assume here that distinctions between groups are based on a single abstract trait, with only four available types. Future work might take account of the fact that group distinctions are socially constructed. Indeed, broadening the boundaries of what is perceived as the in-group represents one important policy approach to reducing ethnocentric behaviors. Our results also suggest several other policy implications worth further study. We have demonstrated that ethnocentrism can be an effective mechanism for supporting cooperation in the absence of such conditions as continuing interactions, well-developed institutions, and strong social norms. These conditions do often exist in society and may help to lower reliance on in-group favoritism to generate cooperation. Similarly, we show that the ability to discriminate based on group membership is especially helpful to cooperation in our model in more austere environments (e.g., when the individual cost of cooperation is high). Reducing the costs of cooperation (or increasing its benefits) might therefore reduce the value added of discriminatory behaviors. Finally, our model speaks to Putnam's (2000) concepts of "bonding" and "bridging" capital, by demonstrating how easily ethnocentrism creates "bonding" social capital within groups. Efforts to reduce discrimination might focus on how to create opportunities for creating "bridging" social capital *between* groups as well.

APPENDIX
Model Implementation

Initialization:

- Create empty torus of size LatticeSize × LatticeSize (default 50 × 50) [Von Neumann geometry]
- Initialize parameters:

  Cost (of giving help) = 0.01 **Benefit** (of receiving help) = 0.03 **BasePTR** = 0.12
  MutationRate = 0.05 **DeathRate** = 0.10 **ImmigrationRate** = 1
  RunLength = 2000 **LatticeSize** = 50

- Set Time = 1

In each time step, follow the process shown in Figure A1.

1. Immigration
- Create ImmigrationRate new agents with random traits (strategy and tag).
- Place the new agent(s), one at a time, each in a random empty site on the lattice.

2. Interaction
- Reset PTR of all agents to BasePTR;
- For each adjacent neighboring agent N of each existing agent A:
  - A decides whether to donate to N (based on the tags of each and on A's strategy).
  - If A donates, PTR of A is lowered by Cost and PTR of N is raised by Benefit.
  - N decides whether to donate to A (based on the tags of each and on N's strategy).
  - If N donates, PTR of N is lowered by Cost and PTR of A is raised by Benefit.

3. Reproduction
- Sort the list of all currently existing agents into a new random order.
- In this new random order, each agent is given a chance to reproduce with probability equal to its PTR. If the PTR probability is realized for an agent:
  - Check if there are one or more empty spaces adjacent to the agent.
  - If so, clone an offspring of the agent onto one of these empty sites chosen at random.

The offspring receives the traits of its parent, except that each trait changes with probability equal to the MutationRate. If no space is available, no offspring are created.

4. Death
- Each agent has a chance of dying (and being removed from the lattice) equal to DeathRate.

Advance Time by one period. If Time = RunLength, stop. Otherwise, return to step (1) and repeat.

Figure A1: Agent-Based Simulation Technique Model

REFERENCES

Alford, John R., Carolyn L. Funk, and John R. Hibbing. 2005. Are political orientations genetically transmitted? *American Political Science Review* 99 (2): 153-67.

Axelrod, Robert. 1984. *The evolution of cooperation*. New York: Basic Books.

———. 1986. An evolutionary approach to norms. *American Political Science Review* 80:1095-1111.

Axelrod, Robert, and William D. Hamilton. 1981. The evolution of cooperation. *Science* 211:1390-6.

Axtell, Robert. Forthcoming. Three distinct kinds of empirically-relevant agent-based models. *Ecology & Society*.

Boyd, Robert, and Peter J. Richerson. 1985. *Culture and the evolutionary process.* Chicago: University of Chicago Press.

Brewer, Marilynn B. 1979. The role of ethnocentrism in intergroup conflict. In *The psychology of intergroup relations*, edited by W. G. Austin and S. Worchel. Monterey, CA: Brooks/Cole.

Brewer, Marilynn B., and Roderick M. Kramer. 1986. Choice behavior in social dilemmas: Effects of social identity, group size, and decision framing. *Journal of Personality and Social Psychology* 50:543-49.

Brown, Donald E. 2004. Human universals, human nature, and human culture. *Daedalus* 133 (4): 47-54.

Cashdan, Elizabeth. 2001. Ethnocentrism and xenophobia: A cross-cultural study. *Current Anthropology* 42:760-5.

Chirot, Daniel, and Martin E. P. Seligman. 2001. *Ethno political warfare: Causes, consequences, and possible solutions.* Washington, D.C.: American Psychological Association.

Coleman, James S. 1990. *Foundations of social theory*. Cambridge, MA: Harvard University Press.

Dawkins, Richard. 1989. *The selfish gene: New edition*. Oxford, UK: Oxford University Press.

Dovidio, Jack F., and Samuel L. Gaertner. 1993. Stereotypes and evaluative intergroup bias. In *Affect, cognition and bias*, edited by D. Jackie and D. Hamilton. San Diego: Academic Press.

Ferguson, C. K., and H. H. Kelley. 1964. Significant factors in over-evaluation of own-group's product. *Journal of Abnormal and Social Psychology* 69:223-8.

Hamilton, William D. 1964. The genetical evolution of social behaviour: I and II. *Journal of Theoretical Biology* 7:1-52.

Hammond, Ross A., and Robert Axelrod. 2006. Evolution of contingent altruism when cooperation is expensive. *Theoretical Population Biology* 69:333-8.

Hardin, Russell. 2002. *Trust and trustworthiness*. New York: Russell Sage Foundation.

Hechter, Michael, and Karl-Dieter Opp. 2001. *Social norms*. New York: Russell Sage Foundation.

Hewstone, Miles, Mark Rubin, and Hazel Willis. 2002. Intergroup bias. *Annual Review of Psychology* 53:575-604.

Hirschfeld, Lawrence A. 1996. *Race in the making.* Cambridge, MA: MIT Press.

Hobbes, Thomas. [1651] 1992. *Leviathan*. Reprint, New York: Collier.

Kinder, Donald R. 1998. Opinion and action in the realm of politics. In *Handbook of social psychology*, edited by Daniel T. Gilbert, Susan T. Fiske, and Gardner Lindzey. Boston: McGraw-Hill.

Klein, Jill, and Richard Ettenson. 1999. Consumer animosity and consumer ethnocentrism: An analysis of unique antecedents. *Journal of International Consumer Marketing* 11:5-24.

Kramer, Roderick M., and Marilynn B. Brewer. 1984. Effects of group identity on resource utilization in a simulated common dilemma. *Journal of Personality and Social Psychology* 49:1044-57.

Kurzban, Robert, John Tooby, and Leda Cosmides. 2001. Can race be erased? Coalitional computation and social categorization. *Proceedings of the National Academy of Sciences USA* 98:15387-92.

Lacy, Robert C., and Paul W. Sherman. 1983. Kin recognition by phenotype matching. *American Naturalist* 121:489-512.

Lamont, Michele A., and Virag Molnar. 2002. The study of boundaries in the social sciences. *Annual Review of Sociology* 28:167-95.

Lehmann, L., and L. Keller. 2006. The evolution of cooperation and altruism: A general framework and a classification of models. *Journal of Evolutionary Biology*. 19 (5): 1365-76.

LeVine, Robert A., and Donald T. Campbell. 1972. *Ethnocentrism.* New York: John Wiley.

Lichbach, Mark I. 1996. *The cooperator's dilemma*. Ann Arbor: University of Michigan Press.

Molander, Per. 1985. The optimal level of generosity in a selfish, uncertain environment. *Journal of Conflict Resolution* 29:611-8.

Nowak, Martin A., and Karl Sigmund. 1998. Evolution of indirect reciprocity by image scoring. *Nature* 393:573-7.

Ostrom, Elinor. 1998. A behavioral approach to the rational choice theory of collective action. *American Political Science Review* 92:1-22.

Putnam, Robert D. 2000. *Bowling alone*. New York: Simon & Schuster.

Rabushka, Alvin, and Kenneth Shepsle. 1972. *Politics in plural societies: A theory of democratic instability*. Columbus, OH: Merrill.

Ray, John J., and F. H. Lovejoy. 1986. The generality of racial prejudice. *Journal of Social Psychology* 126:563-4.

Riolo, Rick L., Michael D. Cohen, and Robert Axelrod. 2001. Evolution of cooperation without reciprocity. *Nature* 414:441-3.

Roosens, Eugene E. 1989. *Creating ethnicity: The process of ethnogenesis* (Frontiers of Anthropology, Vol. 5). Newbury Park, CA: Sage.
Samuelson, Paul A. 1947. *Foundations of economic analysis*. Cambridge, MA: Harvard University Press.
Sherif, Muzafer. 1966. *Group conflict and co-operation: Their social psychology*. London: Routledge Kegan Paul.
Sherif, Muzafer, and Carolyn W. Sherif. 1956. *Groups in harmony and tension.* 2nd rev. ed. New York: Harper.
Simmel, Georg. 1955. *Conflict and the web of group-affiliations*. New York: Free Press.
Simon, Herbert. 1990. A mechanism for social selection and successful altruism. *Science* 50:1665-8.
Smith, Adam. [1776] 1994. *Wealth of nations*. Reprint, New York: Modern Library Edition.
Sober, Elliot, and David S. Wilson. 1998. *Unto others: The evolution and psychology of unselfish behavior*. Cambridge, MA: Harvard University Press.
Spence, A. Michael, and Richard Zeckhauser. 1971. Insurance, information, and individual action. *American Economic Review* 61:380-7.
Struch, Naomi, and Shalom H. Schwartz. 1989. Intergroup aggression: Its predictors and distinctness from in-group bias. *Journal of Personality and Social Psychology* 56:346-73.
Sumner, William G. 1906. *Folkways*. Boston: Ginn.
Tajfel, Henri. 1970. Experiments in intergroup discrimination. *Scientific American* 223:96-102.
Tajfel, Henri, Michael G. Billig, R. P. Bundy, and C. Flament. 1971. Social categorization and intergroup behavior. *European Journal of Social Psychology* 1:149-78.
Tilly, Charles. 1992. *Coercion, capital, and European states, AD 990-1992*. Cambridge, UK: Blackwell.
Trivers, Robert L. 1971. The evolution of reciprocal altruism. *Quarterly Review of Biology* 46:35-57.
van der Dennen, J. M. G. 1995. *The origin of war*. Groningen, Netherlands: Origin Press.
Wrangham, Richard. 2004. Killer species. *Daedalus* 133 (4): 25-35.
Wu, Jianzhong, and Robert Axelrod. 1995. How to cope with noise in the iterated prisoner's dilemma. *Journal of Conflict Resolution* 39:183-9.