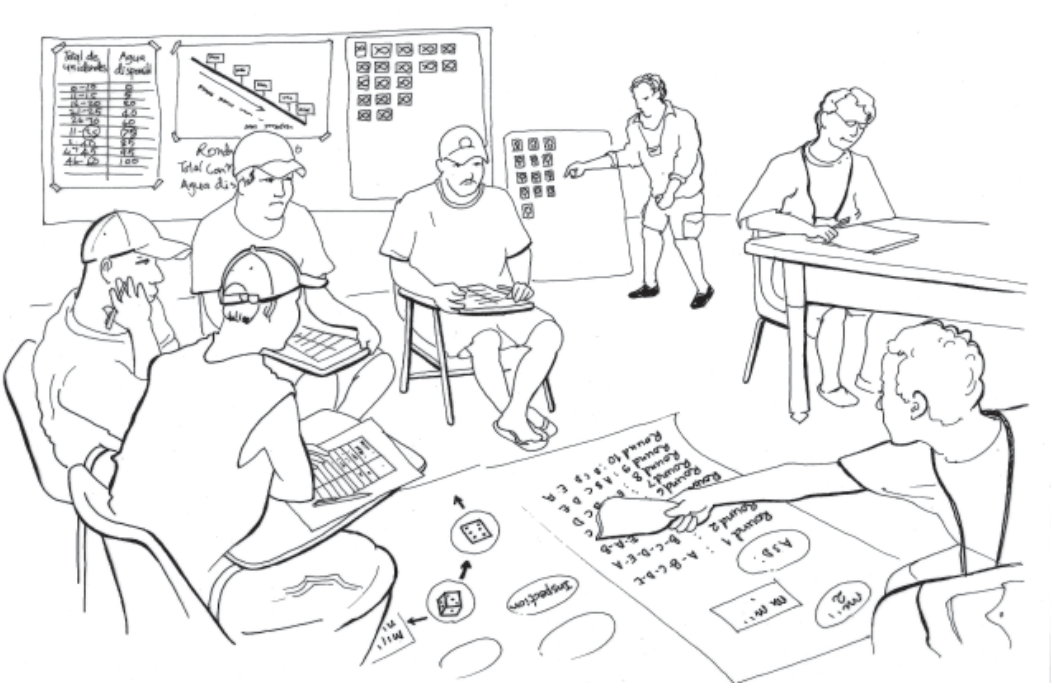
Using Games to Support Collective Action in the Real World



SOURCE:

Cardenas, J.C. 2009. *Experiments in Environment and Development: Annual Review of Resource Economics.* Vol. 1: 157-183 (Volume publication date, October 2009) (doi:10.1146/annurev.resource.050708.144056).

The use of economic games in the field to explore how people's decisions affect individual and collective well-being has increased over the last few years as a tool to study economic behavior (Table 1). There are a number of applications of these games to issues of development and the environment, with quite a number of these addressing particular aspects of collective action such as cooperation, voluntary contributions to public goods, trust, reciprocity, altruism, and social norms.

These games (also called economic experiments) have been replicated in very different cultural settings, and participant pools. Some robust patterns have emerged from these studies; however, variation across experiences has also enriched the understanding of human behavior. While most games are used as research tools, some researchers have observed that the use of games in research-for-development interventions can increase awareness and understanding of collective action in communities and, ultimately, in some cases, increase cooperation.

Economic Games

Economic games are the equivalent of experiments for social scientists. A game consists of players, rules, and reward structures. Games are designed to mirror real life situations, and are especially useful for looking at intangible issues like trust, fairness, and cooperation. Changing the rules of the

Table 1. Questions, Behavioral Aspects, and Experimental Strategies.

Issues in development and the environment	Trade-offs and interesting questions	Experimental designs from the field and the lab
• Risk exposure, risk aversion, and poverty	• Risk versus higher returns • Technology adoption	• Lotteries, varying variance, and expected returns
• Time discounting, saving rates, pensions	• Consumption today versus consumption tomorrow	• Payments spaced in time
• Prosociality toward others today (fairness, inequality) • Prosociality toward kin in the future • Prosociality toward non-kin in the future	• My consumption today versus sharing with kin today • My consumption today versus sharing with others today • My consumption today versus saving for kin tomorrow	Social preferences: • Altruism (dictator, ultimatum) • Reciprocity and trust (ultimatum, trust, gift exchange) • Cooperation (prisoners dilemma, common-pool resources CPR, voluntary contributions game VCM) • Third-party punishment
• Protection of the environment	• Consumption today versus resource exhaustion tomorrow • Consumption today versus extinction tomorrow • Protecting today versus consumption of others (next generations) tomorrow	• WTA/WTP (hypothetical, experimental) offers • Donations to environmental protection programs and charities • Ecological or environmental intrinsic values • CPR and VCM games
• Environmental institutions and mechanisms	• Market versus state versus community-based management of the local and global commons	• Market-based institutions (ITQs, fees, quotas, command and control) • CPR and VCM games
• Market-based growth through competition, specialization and access to credit and microfinance	• Cooperation versus competition (complementary? conflicting?) • Innovation versus risk for the uninsured • Adaptive (resilient) multitasking versus specialization	• Market behavior (double auction, posted offers, etc.)
• Provision of public goods, regulation, and corruption (education, health, security, recreation, etc.)	• Market- versus state- versus community-based provision of local public goods • Rule of law, compliance, rent-seeking	• CPR and VCM games • Endogenous versus external regulations • Corruption
• Self-government and social networks	• Private versus state versus communal insurance over risks	• (Lotteries) risk and risk-pooling games • Existing and controlled social networks experiments in combination with social preferences experiments

game allows researchers to test how regulations or other institutional innovations affect individual behavior and collective outcomes. A key element of the games is that the rewards or payoffs that people earn are real, usually money but possibly also in-kind. Because the playoffs are real, the games are not considered hypothetical.

In a commonly used forestry game, five players exploit a forest with an initial stock of 100 trees. During each round, the forest can grow at a rate of 10 percent, i.e. for each 10 standing trees, one more tree might grow; altogether, the forest can grow up to 100 trees. During each round of the first stage, each player can cut up to five trees and receive a cash payment of say, USD 0.50 for each tree. By the end of the game, each player receives in cash his/her earnings from the total accumulated during the game.

If the stock falls below 25 trees, the maximum trees allowed to each player decreases such that the group maximum does not exceed the total number of trees available. Decisions are made in private and are kept confidential, and during each round only the total group extraction is announced. The first stage consists of a maximum of 10 rounds with no communication allowed among the five players.

During the first stage, a "rational" strategy for an individual player would be to extract the maximum number of trees allowed for each round. If all players adopt this strategy, then in every round 25 trees would be cut and the forest wiped out by the sixth round. Under this individualistic strategy (usually called Nash strategy), the group would amass a total of 119 trees.

In contrast, a socially efficient sustainable path of extraction would be to postpone exhaustion of the forest until the tenth round. This strategy would yield 166 trees. The challenge to achieving this outcome is that players will not voluntarily refrain from extracting unless they have some assurance that the others will also refrain, and the basic game structure does not provide this. Under either the Nash or the socially-optimal solution in this game, the final forest stock will be zero trees, given that at the end of the tenth round, any remaining trees have no value to the players.

In a set of sessions in a village or project, one could try variations of this game to compare the results and discuss them with the participants. For instance, one can compare the case when the game is played among five people who know each other well as opposed to five strangers. One could also introduce changes in the rules and test different institutional arrangements, e.g. allowing the group to have an open conversation before each round of the game, test the effect of public disclosure of individual decisions among players after each round, or test the effect of a system of monitoring and sanctions funded by the players.

Games in Development Research

Games have been shown to create a more interactive environment for researchers, field practitioners and communities. The data collected from the games are used to generate discussion with the participants about the similarities between what happened in the games and their reality.

For instance, in a study recently conducted with this game in six rural villages of Thailand and Colombia, it was found that the participants avoided the tragedy of commons and, in fact, at the end of the 10 rounds trees were left standing despite the fact that within the game, any standing tree had no monetary value for the players. A follow-up conversation with the participants after the games revealed that the participants had assigned an intrinsic value to the standing trees and felt some trees had to remain for symbolic purposes.

There are some advantages to using the games to create an environment for a conversation among actors. These have to do with the two-way interactions between three components of the framework shown in Figure 1: a *theoretical model* that gives us benchmarks to compare the results obtained in the field; a design of the *games or experiments* that allow for testing of different treatments controlling for the rest of the variables; and the *reality* and its stakeholders.

These two-way interactions complement each other in various ways. For instance, a policy discussion (F,C) between a particular theory about conservation of natural resources and the stakeholders could benefit by testing first with these games (A,D) different configurations of such policies and then be brought to the reality (B,E) with adjustments from what was learned in the field lab setting.

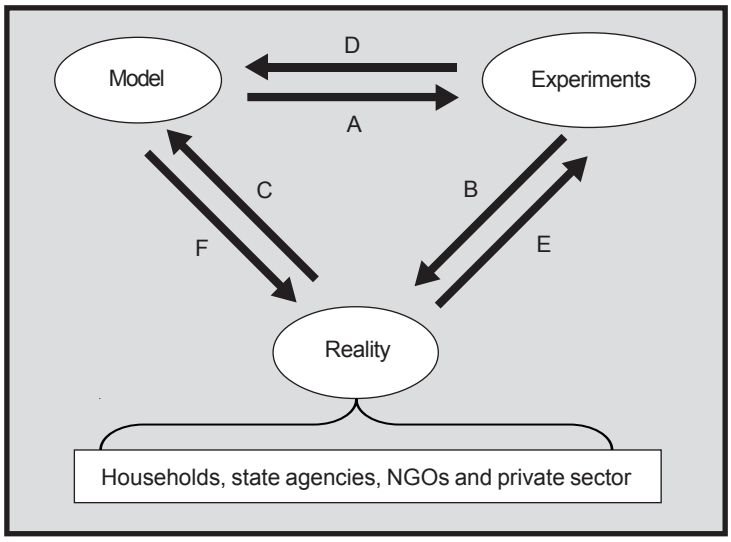


Figure 1. Relationship Between Theoretical Models, Experiments, and Reality.

The possibility of a trial-and-error iteration using games and the feedback obtained from the active participation of community members, NGOs, and local public officers could create a more fertile terrain for the final design and implementation of a policy or program that better reflects the interests and views of the stakeholders.

This is particularly true for problems of collective action and property rights where individual and group interests may be in conflict and where legitimacy and enforcement capacity of regulatory agencies are limited.

Games in Development Interventions

While economic games are used by practitioners to create a space for dialogue with communities, they may also play a role as pedagogical tools for self-reflection and social change.

In a study conducted in three villages in rural Colombia, the researchers conducted a number of these games based on a common-pool resource situation in which each player had to decide how much effort to put into extracting the resource. After the games were completed, there was a community workshop in each of the villages to discuss with the participants and other members of the village the main results from the games and the implications of the different treatments (changes in rules of the game) on behavior and outcomes. About one year later, the researchers were able to return to these same villages with the intention to repeat the exact same games under the same sets of incentives. They recruited not only people who had participated in the previous games a year earlier, but also new participants. Or so it seemed!

The researchers were astounded to see that from the start of the games this time, and without any apparent communication during the games themselves, the rates of cooperation were substantially higher than a year earlier. A new follow-up workshop and interviews revealed that the "experienced" players remembered quite well the functioning of the games. During the recruitment stage, they were able to spread the word among both the ones that participated before and the new ones, that a cooperative strategy by the groups would maximize the amount of cash for the groups, creating an *ex-ante* agreement, or as they said, "we learned from the games at that time that cooperation pays."

Conclusions

The use of economic games or experiments for the study of issues of development and the environment has increased substantially over the last few decades. Behavioral sciences have made large contributions to the understanding of collective action and how rules and norms play a crucial role in problems of managing common-pool resources and solving the dilemmas of group-based property rights.

In addition to helping to understand the foundations of behavior, these games can create a space for an interactive dialogue with communities facing these dilemmas. The games offer some potential for self-reflection in a dialogue among stakeholders, and even for social learning processes that create actual changes in behavior beyond the domain of the controlled game.

Suggested Readings

Cardenas, J.C. and J. Carpenter. 2008. *Behavioural Development Economics: Lessons from Field Labs in the Developing World.* Journal of Development Studies. Vol. 44, No. 3 (March 2008): 337-364.

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Ostrom E. 2006. *The Value-Added of Laboratory Experiments for the Study of Institutions and Common-Pool Resources.* J. Econ. Behav. Organ. 61(2):149–63.