

Cultural Evolution and Social Norms
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Faculty Organizer: Jean-Paul Carvalho

Human behavior is shaped by history and social interaction. This process of cultural evolution includes the intergenerational accumulation of knowledge, the cultural transmission of beliefs and preferences, and the evolution of social norms. Cultural evolution was first studied by evolutionary biologists and ecologists and has more recently gained prominence in economics. This conference brings together leading economists, evolutionary biologists, ecologists, anthropologists, and philosophers to take stock of recent developments in modeling cultural evolution and identify new directions for research. Topics include the emergence of cultural diversity, family structure, consumption norms, economic underrepresentation, and the political economy of cultural movements.

Titles & Abstracts
Alphabetical Listing

Erol Akcay, University of Pennsylvania

Title: On social norms as choreographers of social interactions and as generator of prosocial preferences

Abstract: Social norms are complex emergent phenomena that result from the interaction of mechanisms at multiple scales, from individual level cognition to population level gene-culture coevolution. Some social norms prescribe particular behaviors and induce expectations and preferences on others' behaviors to turn social dilemmas into coordination games while others coordinate individual behavior to implement correlated equilibria that improve on Nash equilibrium outcomes. In this talk, I will present two models that consider different aspects of social norms, first, as "choreographers" of individual behavior in social interactions, and second as a mechanism to induce pro-social preferences. In the first model, we consider the emergence of normative meaning of random events in the world. These events have no inherent relevance to the social interaction or payoffs of individuals, but individuals can interpret them as prescribing certain behaviors and implying expectations about others' behavior. These interpretations can thus give rise to prescriptive and descriptive norms. We then consider the evolutionary dynamics of such interpretations, and how that the evolutionarily stable interpretations implement correlated equilibria of the game being played. This result highlights that norms coordinating individual behavior can arise spontaneously without a central agency and without common knowledge or information exchange between agents. In the second model, we consider a public goods game with a co-evolving group contribution norm, external punishment, and internalized preferences for complying with the norm. We show that evolving intrinsic preferences for compliance may require the presence of external punishment, but the two are jointly stable only when the public goods exhibit sufficient complementarity. This result underscores the complex interplay between intrinsic and extrinsic incentives and how they might constrain the evolution of efficient social norms.

Alberto Bisin, New York University

Title: Culture and Institutions

Abstract: In this paper we provide a theoretical abstract modeling of the interaction between culture and institutions and their effects on economic activity. We characterize conditions on the socio-economic environment such that culture and institutions complement (resp. substitute) each other, giving rise to a multiplier effect which amplifies (resp. dampens) their combined ability to spur economic activity. We show how the dynamics of culture and institutions may display interesting non-ergodic behavior, hysteresis, oscillations, depending on whether culture and institutions are complement or substitute. Finally, in specific example societies, we study how our model of the interaction of culture and institutions can be applied to elucidate several interesting conceptual issues in the literature: e.g., the formation and sustainability of extractive institutions, civic culture, legal systems for the protection of property rights. Historical applications of the analysis (with A. Seror and J. Rubin) are discussed; specifically to the "Long Divergence" between the West and the Muslim world and to the "Questione Meridionale" in the context of Italian economic history.

Rob Boyd, Arizona State University

Title: Arbitration supports reciprocity when there are frequent perception errors

Abstract: Cooperation based on reciprocity is undermined by perception errors, mistakes that cause interacting individuals to disagree about past behavior. Strategies like Win-Stay-Lose-Shift and Generous Tit for Tat can reestablish cooperation following a perception error but only when errors arise infrequently. We introduce a strategy that relies on third-party arbitration to resolve disagreements, and show that this strategy can resist invasion by a range of plausible alternative strategies even when perception errors are frequent and the opinions of the arbitrators are inaccurate or biased. The fact that third-parties can resolve perception errors could explain why reciprocity is rare in other animals despite opportunities for repeated interactions, and why human reciprocity is embedded in systems of culturally transmitted moral norms in which community monitoring plays a role.

Jean-Paul Carvalho, University of California, Irvine

Title: Identity and underrepresentation

Abstract: We analyze economic underrepresentation as a product of identity-dependent norms. The larger a group's representation in an economic activity (e.g. education, high-status occupation), the more the activity is deemed 'appropriate' for its members. The dynamic feedback between a group's representation and its norms of economic participation produces

more severe and robust forms of inequality than previously found. Equality of opportunity almost never results in equal outcomes, even when groups have the same productivity. Minorities and historically discriminated groups tend to be underrepresented. Glass ceilings emerge endogenously, as identity concerns cause underrepresentation to escalate at senior levels. These problems are not easily solved using standard policy tools. Identity-based quotas reduce economic output and temporary interventions are insufficient. When identities are multidimensional (e.g. race and gender), reducing underrepresentation along one identity dimension can increase underrepresentation along another. Hence the common reductionist approach of addressing inequality dimension by dimension often fails. Our results suggest that underrepresentation may be an intractable outcome of group identity.

Nicole Creanza, Vanderbilt University

Title: Models of cultural evolution in structured populations

Abstract: Many foundational models of social learning and cultural evolution are constructed within the framework of theoretical population genetics. With genetic evolution as a starting point, models of cultural evolution emphasize that cultural traits—learned behaviors such as beliefs, practices, and tools—can be transmitted between individuals and are subject to evolutionary forces such as selection and drift. In contrast to the assumptions of these models, however, human (and animal) interactions are unlikely to be ideally represented by well-mixed populations. Humans and animals have complex contact networks, where interactions between some individuals are common and interactions between other individuals are rare or absent. Some of these differences in interaction might be due to the spatial distribution of individuals in a population; individuals located in geographic proximity are more likely to interact. Other differences might be driven by social structure, with interactions on a social network more likely to occur between genetically related individuals and between individuals sharing social contexts. Here, I discuss a set of new models that explore how spatial or network structure can affect the spread of a cultural trait compared to well-mixed populations. These models apply broadly to learned behaviors, from bird songs to human languages and cultural traditions. Understanding the spatial and environmental dynamics of cultural interactions could shed light on fundamental concepts in the evolution of behavior, such as social learning, cooperation, and cumulative culture.

David Hirshleifer, University of California, Irvine

Title: Visibility bias in the transmission of consumption beliefs and undersaving

Abstract: We study how bias in the social transmission process affects contagion of consumption beliefs and behavior. In the model, consumption is more salient than non-consumption. This visibility bias causes people to perceive that others are consuming heavily and have favorable information about future wealth prospects. These inferences increase aggregate

consumption. In contrast with other approaches, the visibility bias approach suggests that relatively simple disclosure policy interventions can ameliorate undersaving. In contrast with the Veblen wealth-signaling approach, information asymmetry about wealth *reduces* overconsumption. Our approach offers new implications about the effects on saving of social connectedness, observation biases, and demographic structure; and offers a novel explanation for the dramatic drop in the savings rate in the US and several other countries in the last thirty years.

Larry Iannaccone, Chapman University

Title: God Games: An experimental study of uncertainty, superstition, and cooperation

Abstract: This paper tests classic claims about the origins and functions of religion and superstitions. We do so by modifying the standard VCM public goods game, adding a god-like agent that adjusts group earnings in a manner that, though effectively random, might plausibly depend on rates of cooperation. Although players' earnings and the agent's adjustments are reported separately, the mere presence of adjustments induces radically higher rates of group investment – whether the adjustments are described as "random" or "chosen" by an AI who monitors investments. Investment patterns, survey responses, and group chat witness to superstitions that arise in response to risk and (especially) to uncertainty. Although some superstitions enhance group welfare, text-based chat turns encourages a counterproductive quest for magical numbers.

Natalia Komarova, University of California, Irvine

Title: Mathematical modeling of culture: learning from an inconsistent source and music evolution

Abstract: In this talk I will introduce some recent work on mathematical modeling of human behavior. The first part of the talk is devoted to learning dynamics. In a series of experiments, subjects were to learn labels for a number of computer-generated objects, a task that was made significantly more difficult by making the training exemplars very inconsistent. The question we asked was whether the presentation order could influence the subjects' ability to deal with the noise. A mathematical model of Rescorla-Wagner type helped identify the differences in the learning under different presentation orders. The second part of the talk focuses on the evolution of contemporary music. An analysis of about half a million songs released in the last 30 years revealed interesting patterns of behavior, and allowed to predict songs' success.

Elena Miu, Arizona State University

Title: Models of cumulative cultural evolution

Abstract: Cumulative cultural evolution—the process by which our species builds and improves upon knowledge from previous generations—has allowed humans to achieve the astounding ecological success witnessed today. A variety of factors have been deemed key for maintaining this process, from human cognition to demography. Despite the fact that cumulative culture routinely produces complex, interacting traits, the modeling literature has typically operationalized traits in simple way – as a sequential progression, where learning a more advanced trait merely depends on knowing the previous traits in a linear hierarchy. Here we use two complementary means of modeling cumulative cultural evolution in order to investigate how two key processes, innovation and recombination, interact.

In an empirical study, we investigated the evolution and dynamics of cumulative culture in a realistic setting with a large-scale dataset of computer code resulting from a series of collaborative programming competitions run over a 15-year period, showing that cumulative cultural evolution reduces innovation and technological diversity over time, as populations focus on refining high-performance solutions. While individual entries borrow from few sources, iterative copying allows populations to integrate ideas from many sources, demonstrating a new form of collective intelligence.

In a theoretical study, we implemented a more general depiction of a cumulatively evolving trait which, in this framework, is defined by three parameters: (1) the number of levels through which it can be refined, (2) the number of options available at each level, and (3) the magnitude of dependency between options at different levels. Each option at each level is associated with a particular payoff, but as dependencies increase these payoffs change contingent on what options were chosen at other levels, capturing a level of path dependency often seen in human culture. We found that for easy tasks, when finding an optimal solution on your own is feasible, learning based on individual innovation achieves the highest performance. For difficult tasks, however, the highest performance is achieved through learning based on recombining already existing traits in the population.

Jared Rubin, Chapman University

Title: A theory of conservative revivals

Abstract: Why do some societies fail to adopt more efficient institutions in response to changing economic conditions? And why do such conditions sometimes generate conservative ideological backlashes? We propose an explanation highlighting the interplay- or lack there of between productivity, cultural beliefs, and institutions. In our model, production shocks benefiting one sector of the economy may induce forward- looking elites to provide public goods associated with a different, more traditional sector that benefits their interests. This results in

more agents generating cultural beliefs complementary to the provision of traditional goods that are associated with an outdated economic environment.

Brian Skyrms, University of California, Irvine

Title: From Democritus to signaling networks

Abstract: A review of some adaptive dynamics of learning and evolution applied to signaling games

Myrna Wooders, Vanderbilt University

Title: Own experience bias in a labor market with heterogeneous rewards

Abstract: We develop a model with which to explore discrimination and prejudice within labor markets. Our approach emphasizes the role of an individual's own experience in the assessment of efforts of other individuals. Specifically, we consider a two stage process in which individuals first learn, through experience, whether effort is rewarded and then subsequently have to estimate the effort of others. Our theoretical results suggest that those who are not rewarded for high effort will underestimate the effort of other individuals while those for whom effort is rewarded will (slightly) overestimate the effort of others. We empirically test and confirm this prediction in the lab.