



Advancing the Study of Cultural Evolution:
Academic Integration and Policy Applications

A workshop held at the University of Maryland College Park Campus

March 19th and 20th, 2015

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Description of Conceptual Framework and Workshop Sessions

A Conceptual Framework for the Study of Cultural Evolution

The study of genetic evolution has had over a century and a half to mature. The mechanisms of human cultural evolution evolved by genetic evolution and qualify as an evolutionary process in their own right. The study of cultural evolution may therefore make use of the same conceptual framework that has been developed for the study of genetic evolution. Our workshop was organized with this possibility in mind, while also leaving room for discussing the merits of other conceptual frameworks.

Session 1: The proximate/ultimate distinction and Tinbergen's four questions

Evolutionary theory draws heavily on the distinction between ultimate and proximate causation (Mayr 1959), which notes that all products of evolution require two explanations: 1) Why a given trait exists, compared to many other traits that could exist (ultimate causation); and 2) How a given trait exists in a physical sense (proximate causation). Niko Tinbergen (1963) independently stressed four questions that need to be asked for all products of evolution, concerning function, phylogeny, mechanism, and development. Tinbergen's fourfold distinction adds a temporal dimension to Mayr's two-fold distinction, such that ultimate causation explains the nature of adaptations and the history of their evolution, while proximate causation explains the physical basis of traits and their development during the lifetime of the organism.

These distinctions can potentially be used to organize the study of cultural evolution in the following ways:

Ultimate causation/Function. Cultural evolution adapts human populations to their environments. The same kind of "selection thinking" that informs the study of biological evolution can therefore inform the study of cultural evolution. This does not mean that everything is adaptive. Cultural traits can evolve by drift, as non-adaptive byproducts of adaptations, as adaptations to past environments that are mismatched to their current environments, and so on, just like genetic evolution. The important point is that, *the same conceptual toolkit for ascertaining the presence and absence of adaptations may be able to be employed regardless of the mechanism of inheritance.*

Ultimate causation/History. Archeology and recorded history are the fossil record of cultural evolution and the information is often so detailed that it puts the biological fossil record to shame. These academic disciplines are only beginning to be approached from a modern evolutionary perspective, however. Can the study of human history emulate the study of genetic phylogenies in non-human species? Are there aspects of human history that have no counterpart in evolutionary phylogenetic analysis?

Proximate causation/Mechanism. If cultural change qualifies as an evolutionary process, then there must be cultural inheritance mechanisms that are functionally

equivalent to genetic inheritance mechanisms. Furthermore, cultures must have the equivalent of an anatomy and physiology to coordinate adaptive responses to the environment in a large number of contexts. Mechanisms can be studied at the level of neurobiology, genetics, epigenetics, social learning, and elements of symbolic systems such as sacred texts, rituals, and norms, to list just a few possibilities.

Proximate mechanism/Development. Like genetic adaptations, cultural adaptations develop over the lifetime of individuals, organizations, and institutions. The process of development needs to be understood mechanistically in addition to the fully developed adaptations.

Session 1 of our workshop will discuss the strengths and weaknesses of this conceptual framework for the study of cultural evolution. Key questions include:

- Can these key distinctions from evolutionary biology organize the study of cultural evolution?
- Are other distinctions required that have no counterpart in evolutionary biology?
- What are some good examples of using the “four questions” approach in the current and past study of cultural evolution?
- Is the “four questions” approach useful in formulating new research programs? What are some key questions for future research derived from this framework?

In Appendix 1 of this document, statements from the Participant Information Forms are organized into the categories of ultimate (including function and history) and proximate (including mechanism and development) causation. This is a “living document” so feel free to add to the list.

Session 2: Field Research, Laboratory Research, Theoretical Models and Historical Databases.

Field studies are essential for evolutionary research because the traits of organisms can only be studied in relation to the environmental selection pressures that gave rise to the traits. Laboratory experiments are also important but they must be informed by field research. Otherwise, mismatches between the organism and its laboratory environment can become difficult or impossible to interpret. All scientific inquiry relies upon a dialectic between theory formation and empirical testing. And historical databases are required to address Tinbergen’s “history” question. The best research programs in evolutionary biology include all of these types of research in an interactive fashion.

Session 2 of the workshop will discuss how the study of cultural evolution can proceed along the same lines. Key questions include:

- How can field studies become as central for the study of cultural evolution as for the study of genetic evolution?

- How can laboratory studies be designed to be informed by field studies to avoid the “mismatch” problem?
- How can theory (broadly defined to include analytic models, computer simulation models, and statistical models) be formulated in a way that leads to empirically testable hypotheses?
- How can historical databases be organized in a way that enables theoretically informed hypotheses to be tested?
- How can these methods be best combined to capture synergies?

In Appendix 2 of this document, statements from the Participant Information Forms are organized into the categories of field research, laboratory research, theoretical models, and historical databases. Please add to the list as you see fit.

Session 3: Practical Applications and Ethical Implications

It is typical to imagine a negative tradeoff between basic and applied research. Basic scientific research seeks to understand the nature of reality and leads to practical applications only down the road, if ever. Applied research helps to solve our immediate problems but often lacks intellectual interest. There is no Nobel Prize for social work.

In contrast, human-related evolutionary research often exhibits a *positive* tradeoff between basic and applied research. Asking the most intellectually interesting questions is also the best route to practical solutions over the short term. The reason is because the best basic scientific evolutionary research requires studying people in their environments—from all walks of life, as they go about their daily lives, which is also most relevant for improving the quality of everyday life in a practical sense. We should therefore try to develop research programs that address fundamental issues in cultural evolution while also addressing practical concerns.

All public policies are efforts to “engineer” human social interactions with resulting costs and benefits. All public policies therefore have ethical implications that must be taken very seriously, concerning matters such as equity, transparency, and the possibility of unforeseen circumstances. Evolution provides a certain theoretical perspective for formulating public policy. These policies require the same kind of ethical scrutiny as policies formulated from other perspectives, but the question of whether policies formulated from an evolutionary perspective require *additional* ethical scrutiny needs to be discussed.

Session 3 of the workshop will discuss how to develop research programs in cultural evolution that address fundamental issues while also addressing practical concerns. Key questions include:

- What practical issues are most worth studying from a cultural evolutionary perspective?

- What are some current examples of win-win research programs that address fundamental issues and practical problems at the same time?
- What basic scientific questions deserve top priority even if they will not immediately lead to practical benefits, but might in the long term?
- Are there ethical considerations that are unique to evolutionary theory, in addition to considerations that apply other theoretical perspectives?

Appendix 3 of this document summarizes statements from the Participant Information Forms about applications and ethical considerations.

Session 4: Funding Research in Cultural Evolution:

This session will provide an opportunity for representatives of funding agencies attending the workshop to reflect upon the first day and how the study of cultural evolution fits with the missions of their respective agencies. Appendix 4 lists comments about funding from the Participant Information Forms.

Session 5: Catalyzing the Study of Cultural Evolution

It is our hope that the workshop will result in projects that can help to catalyze the study of cultural evolution in the future. The purpose of Session 5 is to brainstorm about possible projects on the basis of the previous sessions. One possibility is to create a society for the study of cultural evolution. A possible benefit of such a society is for the membership fees to support a staff position for helping to develop some of the other projects.

Appendix 5 lists thoughts about creating a society and other potential projects from the Participant Information Forms.

Session 6. Concluding remarks.

Our concluding session will provide an opportunity to reflect upon the workshop.

Appendix 1. Comments from the Participant Information Forms on Ultimate and Proximate Causation

**In no particular order*

Ultimate Causation (including function and history)

- Role of warfare, societal and ecological threat, disasters on cultural evolution (Turchin, Gelfand, Roos, Nau, Peregrine, Ember)
- Why has warfare and violence evolved as adaptive, and is it still adaptive? (Ember)
- How has climate change shaped evolution? (Ember)
- What makes a culture functional? Does this depend on other cultures? (Nowak)
- Why aren't all cultures the same? (Peregrine)? Why are some culture traits universal (e.g., marriage) and why other traits vary (Ember)
- To what extent is behavior driven by learnability versus functionality (Kirby)
- What is the interaction between ecological conditions – including migratory patterns – and subsistence systems and the genetic changes in relatively specific regions? (Kitayama).
- What general mechanisms explain the collapse of historical empires? How did humans evolve from living in small-scale egalitarian societies of a few hundreds 10,000 years ago to large-scale societies of millions and more, with huge differentials in wealth and power, and state-level institutions (Turchin)
- Archeology (Peregrine)
- Why do we have religion? Why do we die for a group? What is morality and where does it come from? (Whitehouse)

Proximate Causation (including mechanism and development)

- How does human social learning change across the lifespan and how does this order population dynamics (McElreath)
- How does cognitive ability, network composition, and demographic information interact with cumulative culture in humans? (Gervais, Kirby)
- How do learning biases shape the outcome of cultural evolution of behaviors such as language (Kirby)
- How does social learning relate to the evolution of cooperation (Richerson)
- How to measure quantitative values/weights about who influences/learns from whom in different contexts and with what consequence? (Roos)
- How does culture emerge from individual interactions? (Nowak, Kashima)
- How do “joint activities” affect diffusion of culture? (Kashima)
- What is the role of complex network structures in cultural evolution (Brewer, Peregrine; Roos, Nau, Nowak)
- How culture interacts with genes to shape the functional organization of the brain (Han, Kitayama; Gelfand)

- Through what biological and psychological mechanisms do ecological, demographic and cultural variables influence social-relational strategies? What psychological systems regulate relational behaviors such as sharing, collective action, and punishment? (Gervais)
- What sociohuman adaptations (e.g., tolerance, respect, “deep engagement” in friendships, pair-bonding motives) make possible unique social structures? (Gervais)
- How does cultural evolution build systems of behavior (e.g. language, music, art, legal systems) (Kirby)
- To what extent is human “intelligence” culturally evolved in each human lifespan, on account of cultural evolution of learning methods and beliefs from experience? (McElreath)
- What are the proximate mechanisms that underlie rituals and religion? (Whitehouse)
- Can we understand the feedback loop wherein individuals create culture and culture influences the individuals? (Nowak; Gelfand)

Both ultimate and proximate causation

- Can cumulative culture explain differences in language structure (Kirby)
- How does cumulative culture change biological evolution? (Kirby)
- Why is man the only animal to have cumulative cultural capacities? (Gervais, McElreath, Kirby, Turchin)
- Is cultural evolution theory (and the manipulation of instinct) necessary to explain all reciprocity and nepotism in human societies? (McElreath)
- How can we test theories of culture-gene coevolution (Han, Kityama, Gelfand)
- How can we predict rapid pendulum shifts in culture? (Gelfand)

Appendix 2. Comments from the Participant Information Forms on Field Research, Laboratory Research, Theoretical Models and Historical Databases.

Field research: (quantitative and qualitative, longitudinal)

- Big Data (Nowak, Brewer, Whitehouse, Richerson)
- Multisite fieldwork (Gervais, Kashima, Gelfand)
- Metaphor analysis and conceptual blending (Brewer)
- Need longitudinal studies, but these run against granting tendencies and careerism, which promotes short term convenience samples (McElreath)
- Complex network analysis (Brewer, Peregrine)
- High-tech behavioral measures (e.g. sociometric badges) (Whitehouse)
- Portable fieldwork-friendly ways of running implicit and neuroscience measurement (Whitehouse)
- Unobtrusive measures of public culture (Gelfand)

Laboratory research:

- Neuroscience and cultural genetics (Gervais, Han, Kitayama, Gelfand)
- Massive online experiments (Waring, Kashima)
- Metaphor analysis and conceptual blending (Brewer)

Theoretical models:

- Agent based models (Nowak, Nau, Waring, Kirby, Kashima, Brewer, Roos, Gelfand)
- Multi-model approaches (Ember, Gervais, Kirby, Kashima)
- Multivariate modeling of cultural multilevel selection (Waring, Kirby)
- People need to learn dynamical systems theory or another formal system to represent theory so that we can think about culture without falling back on metaphors and imagery (McElreath).
- Theoretical mathematical models (Turchin)
- People need to stop using linear models to predict non-linear processes (McElreath, Richerson)
- Bayesian statistics (Richerson)
- Time series analysis (Peregrine)
- Morphospace analysis (Peregrine)

Historical database:

- Axiomatic demographic decomposition of evolutionary change to assess relative contributions of different factors to cultural change (McElreath)
- Database construction so that we can empirically support some of the big arguments in evolutionary work. This should come with more field stations that support quantitative ethnographic ventures (Richerson)
- Cliodynamics (Turchin)
- Archeology (Peregrine)

- HRAF (Ember, Peregrine)

Appendix 3. Comments from the Participant Information Forms on Practical Applications and Ethical Implications.

Practical Applications

- Can cultural evolution theory be predictive/harnessed? (McElreath, Kashima)
- Can we translate scientific knowledge for social action (Brewer)
- Understanding how cultures emerge, interact, and change (Nowak).
- Understanding how to account for cultures in policy making (Nowak)
- Understanding how to modify violent cultures (Nowak)
- Understand how to preserve dying cultures (Nowak)
- Creating educational systems that play to people's social learning tendencies and biases (Gervais)
- Designing resource management systems that intrinsically motivate people (Gervais)
- Applying local cultural adaptations to disaster relief and disease treatment (Gervais)
- Perhaps applying dynamical control theory to institutional effectiveness. For example, how would one adjust incentives and information available to individuals over time to nudge them towards a welfare enhancing state? (McElreath)
- Solving environmental dilemmas (Waring)
- What factors make group level culture-driven conservation more functional than individual-level consumption? (Waring)
- Education (Han, Whitehouse, Gelfand)
- The genetic risks associated with migration or adaptation to new cultural conditions (Kitayama)
- Modification of resource allocation and contemporary consumer culture (Kashima)
- Guide out society from capitalism towards sustainable energy and elimination of radicalization (Brewer)
- Conflict prevention and management (Whitehouse, Roos, Gelfand)
- Medicine and disease control (Richerson)
- How to stabilize civilizations (Peregrine, Turchin)

Ethical implications

- What if violent behaviors turn out to be culturally adaptive? (Ember)
- Concerns about cultural engineering and manipulation of cultural elements (Gervais, Nau, Waring, Kashima, Gelfand)
- Knowledge egalitarianism and openness (Whitehouse)
- We have to achieve a knowledge of which elements of culture can help before we spread knowledge of what is better or worse about culture (Richerson)

Appendix 4. Comments from the Participant Information Forms on Funding Research in Cultural Evolution

- (Wilson): The John Templeton Foundation is leading the way in funding research on cultural evolution. Hopefully it will continue to do so and will be joined by many other funding agencies, which is an important objective of the workshop. Funding for cultural evolution should be in the same ballpark as funding for genetic evolution.
- (Gelfand): The DOD, since it values interdisciplinary research that can make a big difference on policy. Would like to hear more about what is happening in Europe and Asia and beyond.
- (Nowak): Both the traditional founding sources in US: NSF and NIMH, and European grants can be used to fund these lines of research. Also military grants such as NATO and Minerva are the possible funding sources. Also business might be willing to finance studying cultures, because it often needs to operate between different cultures.
- (Ember): There is still some prejudice in cultural anthropology against evolutionary studies.
- (Gervais): Constraints: as an American anthropologist, I feel unable to utilize the large amounts of research money being made available by the DOD, Army, Air Force Office of Scientific Research, etc. Accepting such money has a stigma within anthropology, owing to its admittedly sordid imperialist past. However, I would view such money as a potential opportunity to infuse US domestic and foreign policy with social scientific knowledge, reflexivity, and humanism. Opportunities: The John Templeton Foundation is extremely interested in questions of human culture, cooperation, religion, and meaning.
- (McElreath): Re constraints, see my earlier comments re longitudinal studies and the culture of grant funding. Re opportunities, there may be Max Planck Society investment in this area coming up. The new department at Jena is focused on historical cultural evolution. And there might be another department opening in Leipzig to focus on contemporary cultural evolution. More generally, I think the future of science funding is non-federal: Templeton, Gates, Kickstarter, etc. A mix of private foundations and direct public investment might change the landscape a lot. For new areas like ours, this might be key, since traditional federal grant culture is often (not always) regulatory capture by entrenched academic interests.
- (Nau): I don't know. But since the workshop participants will include several representatives from funding agencies, this may be a good opportunity to find out.
- (Waring): Cultural evolution research attracts good funding in my experience. Social science disciplines are a huge constraint. Interdisciplinary research presents an opportunity. The public misunderstands and mistrusts evolution, let alone that of culture!
- (Kirby): In the UK, the funding for cultural evolution is really quite diverse, and funders do seem to be open to it as part of the general push towards

- interdisciplinarity. My research group has had funding from: ESRC, AHRC, Leverhulme Trust, British Academy, Royal Society, Wellcome Trust.
- (Han): National Natural Science Foundation of China supports international cooperation on interdisciplinary research.
 - (Brewer): If melded into the world of social impact investing and sustainable development, there could be huge funding opportunities.
 - (Whitehouse): Opportunities are growing as funding agencies increasingly focus on policy-relevant topics. A constraint is that the perceived encroachment of evolutionary thinking into areas previously 'owned' by social science and humanities disciplines will likely continue to meet with some resistance.
 - (Richerson): Most of the ambitious projects I know of are in Europe and the UK. The Anthropology Program at NSF is small and highly competitive.
 - (Peregrine): One of the big problems we face is that our research is, by its very nature, both innovative and interdisciplinary. Many reviewers dislike innovation because there is no guarantee innovations will work, and it is hard for reviewers to evaluate disciplines outside their own. I have had several grants rejected because a reviewer from discipline A likes the discipline A work but doesn't understand why the discipline B work should be done, while a reviewer from discipline B likes the discipline B work but doesn't understand what's being done in discipline A. Thus both say something like "The research I understand is excellent but I don't understand the rest so I rate the proposal very good" and it doesn't get funded. This has happened even in interdisciplinary calls for proposals. It's a serious problem.
 - (Turchin): Being a multidisciplinary area, it basically falls between the cracks.

Appendix 5. Comments from the Participant Information Forms on Catalyzing the Study of Cultural Evolution

What disciplines need to be represented and how can integration best occur:

- (Ember) Cultural psychologists should remember the work that has been done more distally in the last 60 years. Statistics may have been more rudimentary but the findings are still important.
- (Gervais) Ethnographic literature on kinship structures from the 60s will inform cultural adaptations to ecological and social circumstances.
- (McElreath) There is a lot of conceptually related work in co-evolution of symbionts and in disease ecology, as well as in the evolution of transmission systems (evolution of sex, meiosis, mutation rate, chromosomes, sex determination systems, etc.). These are really thought provoking.
- (Kirby) The cognitive science field, broadly.
- (Han; Kitayama) Cultural neuroscience.
- (Kashima) History and Sociology.
- (Brewer) Earth systems theory; Cognitive linguistics; Social analytics.
- (Peregrine) Evolutionary biology and the study of complex adaptive systems and physics.
- (Nowak, Gelfand, Nau, Turchin) Social psychology, political science, and sociology should integrate with computer science, physics, and math to develop formal models of cultural research. Culture should be understood in a multi-level, multi-model sense.
- (Gervais) Big data, cliodynamics, agent-based modeling will eventually require accurate modeling of the human mind. This will force us to construct a periodic table with the “elements” of human socio-cultural psychology.
- (Gervais) Lab studies need substantiating naturalistic field experiments to inform their external validity and generalizability, while fieldwork should be supplemented with experiments.
- (Turchin, Gervais) Computational models should be used to inform inferences.
- (Waring) Cultural evolution is by nature interdisciplinary. More evolutionists should be hired in American departments.
- (Kirby) We need to start making use of cognitive science as a discipline.
- (Peregrine) Santa Fe institute is a great example of people breaking down departmental barriers that are hindering the interdisciplinary evolution of research.

On forming a society for the study of cultural evolution:

- (Wilson) am excited by the prospects of a new society. I would like the membership fees to support a staff position at the Evolution Institute that will enable the society to pursue an activist agenda.
- (Gelfand) This is a very interesting idea to explore. We need a collective space where people from different disciplines can learn from each other and

- forge collaborations. Inhibiting factors are time; there are so many conferences every year. Perhaps a conference every other year. Would definitely join and help to do some organizing.
- (Nowak) I think there is a clear need for the society. It could fill the niche of interdisciplinary research on culture. I would join the society. I am willing to commit my time to organizing it
 - (Gervais): I think such a society would be valuable if it did not trade off with integrating cultural evolution studies into the larger intellectual movements in anthropology, psychology, and the like. Organizing sessions, symposia, and workshops at established society meetings (e.g., HBES, SPSP, AAAs) should be a top priority for cultural evolution folks, who need to become more mainstream to fully effect their goals. Establishing a Cultural Evolution Society runs the risk of further marginalizing cultural evolution research, if folks go to this meeting instead of larger conferences. However, if such a society were a mechanism for sponsoring disciplinary integration, and publicizing cultural evolution research, then it might be worthwhile. I would join, and I could see co-organizing a session at the AAAs or HBES, but I do not have the resources to serve a leadership role in it .
 - (McElreath): Interdisciplinary societies tend to have trouble sustaining momentum. But I am not the most social of scientists right now, since I have a young child, so I keep travel to a minimum. So maybe I am out of touch on this topic. But for younger scholars, the question is what such a society could do to help them get training and jobs. People have to make a living doing this thing, if it is to be and continuing being a thing.
 - (Waring): I would absolutely join such a society, I find that I have no conceptual or collegial home other than those that I can make at other conferences through special sessions. There is a need for such a society, but enacting one should be very carefully planned and executed. A Society for the Study of Cultural Evolution would serve the niche of people who study cooperation and culture from interdisciplinary perspectives with quantitative tools. I am willing to contribute time to organizing such a society, post tenure. Part of the limitations of such a society are that the population is small, and embedded in many other disciplines.
 - (Kirby): I'm not sure whether there needs to be a new society, but I think it would be interesting to have a conference series on the topic.
 - (Whitehouse): Yes to all the questions for which a yes/no is appropriate. On niches, this is quite a complex question – let's discuss it in the workshop.
 - (Richerson): I definitely think that such a society would be a good idea. Peter Turchin and I have talked a bit about this. Some of my former students have brought it up with me and there was some talk about it at a Strungmann Forum I co-organized a couple of years ago. I'd be happy to help but the main effort needs to come from the young and midcareer folks who would benefit from it over a larger fraction of their careers. It also needs somehow to advance the unification agenda rather than becoming another silo in the social science firmament.

- (Turchin): Yes. The niche is an interdisciplinary study of how human societies evolve. It's wide open right now. The inhibiting factors are entrenched interests from other disciplines. I would join such a society, and I am willing to contribute my time to organizing it, but I will not spearhead such an initiative.