

Three Videos on Cumulative Culture

Notes, References and Background Reading

Christopher Buckley/ July 2020

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These notes accompany three videos, each lasting 15-23 mins:

[Part I: Introduction](#)

[Part II: Transmission of complex culture](#)

[Part III: The Garden of Forking Paths](#)

In the videos I discuss how culture evolves in traditional, small-scale societies, in the light of the evolution of a group of weaving cultures and loom technologies in East Asia and Southeast Asia. The work is based on a dataset on looms and weaving culture, both qualitative and quantitative, that Eric Boudot and I assembled while working in this region a few years ago. It's one of the largest and most detailed datasets of its type.

What follows are some background notes and references on the topics and issues raised in the 3 videos, in the order in which they appear. This is a personal selection, not an exhaustive bibliography. More extensive references can be found in the “Evolution of an Ancient Technology” paper listed below, and in the supplementary material that accompanies this paper.

At the end of the notes I provide some general “recommended reading” on the evolution of culture.

Key references

Most of the material in these three videos was published in three papers:

[The Evolution of an Ancient Technology, Christopher D Buckley and Eric Boudot, Royal Society Open Science, 2017.](#)

[Investigating Cultural Evolution Using Phylogenetic Analysis: the Origins and Descent of the Southeast Asian Tradition of Warp Ikat Weaving, Christopher D Buckley, PLoS One, 2012.](#)

[A Cultural Inheritance: the Transmission of Traditional Ikat Weaving in the Islands of Indonesia, Christopher D Buckley, Proceedings of the 10th International Shibori Symposium, 2016.](#)

Some of the background material is also in the book I co-authored with Eric Boudot:

The Roots of Asian Weaving: The He Haiyan collection of textiles and looms from Southwest China. Eric Boudot and Chris Buckley, Oxbow Books, Oxford, 2015.

Part I: Introduction

1.1 Weaving Traditions in East and Southeast Asia

An authoritative introduction to the weaving traditions of SEA is Robyn Maxwell's book *Textiles of Southeast Asia: Tradition, Trade and Transformation*. A recent book with good colour photos of textiles and good essays is *Five Centuries of Indonesian Textiles*, edited by Ruth Barnes and Mary Hunt Kahlenberg. The traditions of southern China are discussed in *Roots of Asian Weaving* mentioned above.

The archaeological record of weaving in East and Southeast Asia, and loom technology around the world is reviewed in:

A World of Looms: Weaving Technology and Textile Arts, edited by Feng, Zhao; Sardjono, Sandra and Buckley, Christopher. Zhejiang University Press, 2019.

1.2 Defining and classifying culture

The starting definition of "culture" is a quotation from Edward Tylor's book *Primitive Culture* (2 vols, John Murray, London, 1871). Tylor's book is "of its time", but still worth reading.

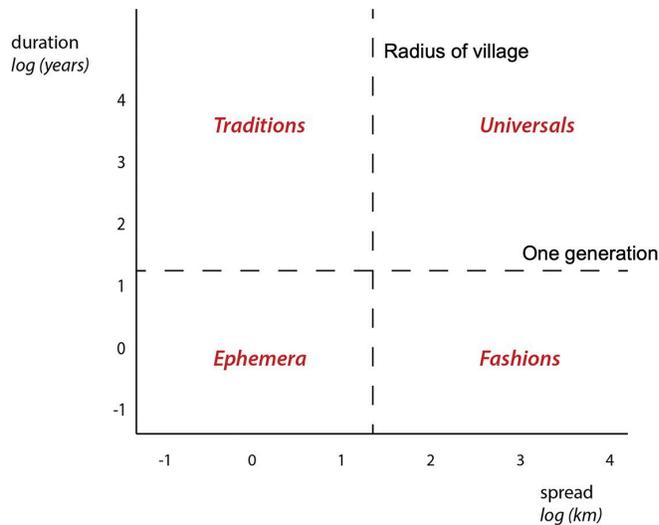
1.3 Horizontal transfer vs vertical transfer

These are basic concepts in the transmission of culture. Some authors also refer to "oblique transfer", which means transfer that occurs between a learner and a more distant family member, such as an uncle or aunt.

Based on what I have seen in the field in small-scale societies, I think vertical transfer can most usefully be defined as intergenerational transfer that occurs within the community, and horizontal transfer is anything that occurs between communities. This is because the community (usually defined as the dialect group, though there is much more to this than just language) is the relevant cultural unit, rather than the individual or the household. Said another way, in the long run it doesn't matter whether you learn from your mother or your aunt.

1.4 Time/distance plots of cultural phenomena

The issue that I raise in the video is that we lack useful ways of classifying culture, which hampers our ability to discuss it. This leads to unproductive arguments, such as whether culture does or does not show tree-like patterns of descent (some does, some doesn't). Taxonomy lies at the heart of empirical science, and we ought to be able to do a better job. The time/distance plot is a step in this direction, and I believe that it is useful in characterizing different kinds of culture and their typical behaviours.



It will be obvious (I hope) that the four kinds of culture that I identified in this plot are actually limiting cases ... real cultural things exist on a continuous scale. The dotted line divisions are based on judgement and depend on what aspects of culture we are trying to identify.

A related idea appears in a paper by Russell Gray, David Bryant and Simon Greenhill, who used a plot with three axes (rate of horizontal transmission, rate of vertical transmission and a quantity they called ‘cultural cohesion’) to compare the behaviors of linguistic traits. In this paper they make the important point that debates about culture are “better conceptualized as involving positions along continuous dimensions”.

I have chosen time and distance for my plots rather than rates of transmission (which are not readily measurable) and used two axes because I am aiming for a tool that can be used empirically.

[Gray RD, Bryant D, Greenhill SJ. On the shape and fabric of human history. Philosophical Transactions of the Royal Society of London B: Biological Sciences. 2010 Dec 12;365\(1559\):3923-33.](#)

We expect **Traditions** to display resolvable lineages, but other types of culture (**Ephemera**, **Fashions**, **Universals**) will not necessarily show this kind of pattern.

Part II: Transmission of Complex Culture

Cultural Transmission is an entire field, with its own fascinating literature. You might think that this work belongs together naturally with the study of Cultural Evolution (since the latter flows from the former), but in fact these fields are distinct and don't overlap much. Nonetheless, I think that if you want to understand patterns of human culture you must begin by studying transmission processes.

The processes that I describe in the video are common patterns that are found around the world in small-scale societies and were once the only ways in which culture was transmitted. Many of them were also common in larger-scale societies until recently, though the increasing dominance of classroom-learning and text-based education has tended to overshadow or replace them (though not entirely).

2.1 General works on cultural transmission:

Miriam T. Stark, Brenda J. Bowser, and Lee Horne, Eds (2008) *Breaking Down Boundaries: Anthropological Approaches to Cultural Transmission, Learning and Material Culture*. Tucson:University of Arizona Press.

2.2 Cultural transmission in the context of weaving

[Buckley, Christopher D, Boudot, Eric \(2017\): Supplementary material from "The evolution of an ancient technology". The Royal Society Collection.](#)

Greenfield PM, Lave J (1982) Cognitive aspects of informal education. In: *Cultural perspectives on child development*. Wagner DA, Stevenson HW editors. WH Freeman, San Francisco CA.181-207.

[Greenfield PM \(1999\) Cultural change and human development. *New directions for child and adolescent development* 83. Spring 1999](#)

[Tehrani, Jamshid J., and Collard, Mark. \(2009\). On the Relationship between Interindividual Cultural Transmission and Population-Level Cultural Diversity: A Case Study of Weaving in Iranian Tribal Populations. *Evolution and Human Behavior*, 30:286–300.](#)

Much valuable information on cultural transmission can also be found scattered amongst general ethnographic literature.

2.3 Apprenticeships in cultural transmission

This is a fascinating sub-field. David Lancy's paper "First You Must Master Pain" is an excellent introduction both to formal apprenticeship systems and the less formal versions found amongst domestic craft traditions. Lancy defines apprenticeship more narrowly than I do, reserving it for situations where a formal agreement is made, and where the master is (usually) not related to the apprentice. The uniformity and near-universal nature of these kinds of processes in human societies is striking.

[Lancy DF. “First you must master pain”: The nature and purpose of apprenticeship. *Anthropology of Work Review*. 2012 Dec;33\(2\):113-26.](#)

Douglas Brooks’ book on Japanese Boatbuilding that I discuss in the video is an example of the formal type of apprenticeship:

[Brooks, Douglas \(2015\) *Japanese Wooden Boatbuilding*. Floating World Editions.](#)

I wrote a review of this book from the standpoint of cultural transmission:

[Buckley C. \(2020\) Japanese boatbuilders and the transmission of traditional culture. *Evolutionary Anthropology: Issues, News, and Reviews*. 2020 Mar;29\(2\):83-5.](#)

If I pointed out that an academic career has many of the characteristics of apprenticeship, including adherence to a strict hierarchy, the assignment of menial tasks, pain etc, I would not be the first to do so.

2.4 Transmission Isolating Mechanisms (TRIMS)

This term comes from a paper by William Durham, in which he introduces this term by analogy with the Reproductive Isolating Mechanisms (RIMs) that help define species in biology. This idea has been picked up in a number of publications on the theory of cultural evolution since Durham introduced it. There is more theory around than actual fieldwork.

[Durham WH. Applications of evolutionary culture theory. *Annual Review of Anthropology*. 1992 Oct;21\(1\):331-53.](#)

The exchange of bridewealth goods between families in East Nusa Tenggara is discussed in a number of publications, of which these are a couple of examples that focus on textiles:

[Barnes R. Without cloth we cannot marry: the textiles of the Lamaholot in transition. *Journal of Museum Ethnography*. 1991 Mar 1\(2\):95-112.](#)

Barnes R. 1989 *The ikat textiles of Lamalera: A study of an eastern Indonesian weaving tradition*. Brill Academic Publishing.

2.5 Transmission across a noisy channel

[Shannon CE. \(1948\) A mathematical theory of communication. *BSTJ* 27, 379–457.](#)

An interesting paper demonstrates via agent-based modelling that redundant information may improve fidelity in cultural transmission:

[Acerbi A, Tennie C. The role of redundant information in cultural transmission and cultural stabilization. *Journal of Comparative Psychology*. 2016 Feb;130\(1\):62.](#)

2.6 The role of ritual

The discussion of the role of ritual in cultural transmission is based on the discussion section in “The evolution of an ancient technology”. This is a potentially interesting area, but currently there is little fieldwork that addresses the question directly. Ritual is a complex area with its own literature, and there are other possible reasons why it occurs. Some community-wide rituals may

have benefits for social cohesion. Some aspects may be a by-product of our cognitive dispositions.

Part III: The Garden of Forking Paths

Jorge Luis Borges' tale, from which the title of the video is taken, can be found in various anthologies of his work. Related themes occur in several of Borges' stories, such as "The Library of Babel".

3.1 Phylogenetic analysis

The justification for applying this method to looms is based upon the detailed observation of cultural transmission processes, discussed in Part II, and the observation that looms are the most conservatively transmitted part of the tradition. There are now numerous examples of the application of this method to material culture: these can be found in the general references for cultural evolution and phylogenetic methods, as can discussions of topics such as consensus trees and the Retention Index (see below).

The database and coding of this large group of looms took around 2 years to complete. The data was assembled over a 10 year period by my co-author Eric Boudot and myself, based on fieldwork, examination of museum examples of looms and ethnographic texts. It may be the largest dataset of material culture assembled to date.

The phylogenetic analysis was done using the MrBayes software. The consensus tree was assembled in Mesquite, which was also used to calculate ancestral states.

3.2 Other phylogenetic analyses of material culture

There are too many of these to list here in full, but many of them can be found in the reference sections of my own papers and the review articles listed below. Here I will mention a group of papers by Jamie Tehrani, Mark Collard and co-workers that investigated Iranian weaving traditions by analysing motifs. The findings are similar to the ones I have mentioned in the context of looms:

[Tehrani J, Collard M. \(2002\) Investigating cultural evolution through biological phylogenetic analyses of Turkmen textiles. *J. Anthropol. Archaeol.* **21**, 443–463](#)

[Tehrani J, Collard M. \(2009\) On the relationship between inter-individual cultural transmission and population level cultural diversity: a case study of weaving in Iranian tribal populations. *Evol. Hum. Behav.* **30**, 286–300.](#)

[Tehrani JJ, Collard M, Shennan SJ. \(2010\) The cophylogeny of populations and cultures: reconstructing the evolution of Iranian tribal craft traditions using trees and jungles. *Phil. Trans. R. Soc. B* **365**, 3865–3874](#)

There is also a group of interesting papers looking at the evolution of stone tools and projectile points (“lithics”) in the Americas. References can be found in the review articles listed below.

3.3 Progress vs stasis

We take “progress” for granted. But if you had been born (say) in a European city in 1000CE you would know that nothing was known that had not already been discovered by scholars in the classical era and subsequently forgotten, and you would take decline for granted, not progress. The present era is a most unusual one, since for much of human history progress was barely perceptible, and at times went into reverse. Many aspects of culture do not progress at all (it would be hard to argue for progress in religion, for example).

The progress in knowledge and technology that we have experienced in the last 300 years or so is real, but has tended to colour our view of the past.

There’s plenty of evidence in traditional cultures that loss of information is the key danger that such traditions face, which explains the patterns of cultural transmission discussed in Part II. Innovation that we have come to revere in modern life is more of a danger than an opportunity. This view is underpinned by some theoretical work:

[Lewis HM, Laland KN. \(2012\) Transmission fidelity is the key to the build-up of cumulative culture. *Phil. Trans. R. Soc. B* 367, 2171–2180](#)

3.4 On the nature of history

[Gray RD, Bryant D, Greenhill SJ \(2010\) On the shape and fabric of human history. *Philosophical Transactions of the Royal Society*, B2010 365: 3923–3933](#)

(also cited above)

3.5 Darwinian Evolution

I make no explicit reference to Darwinian Evolution in these videos. This is deliberate: I want to show how the branching lineages of loom evolution emerge naturally from the data, not impose this model from the start. Nevertheless, this concept underpins the story.

Evolution, as set out by Darwin, consists of three processes: replication, variation and selection. These three processes are necessary and sufficient¹. When present together, they lead to Evolution. Other things often associated with Darwinian Evolution, such as units of selection, genes, genomes, “proper functions”, unconscious selection ... are add-ons or observations that are important to biologists but not part of the basic model². This point has given rise to endless confusion, misunderstandings and irrelevant critiques.

¹ To this list Sewell’s notion of an adaptive landscape might be added. This is arguably implicit in Darwin’s description.

² In “The Origin of Species” Darwin begins his tale with the breeding of fancy pigeons, an example of conscious, directed selection.

Evolution has a vast literature. A good starting point is Daniel Dennett's book *Darwin's Dangerous Idea* (1995, various editions). This is excellent both on the theory itself and the enormous problems experienced with understanding it, despite its apparent simplicity. Problems that continue to this day. Many are willing to dip a toe in this theory, and paddle around a bit, while searching for loopholes³.

Richard Dawkin's books are also worth reading. Though his "meme" concept (progressive for its day) is of limited use. Culture is not composed of little self-replicating parts.⁴

This is not to say that all parts of culture evolve in a Darwinian way. Ephemera, Fashions and Universals do not have resolvable lineages, as noted⁵. Many Traditions do, and these have identifiable lineages and "family trees", like the looms that I have described.

³ Human exceptionalism, free will, self-organizing systems, panspermia, developmental plasticity, niche construction ... you name it, someone has declared that Darwin needs "revising" or "extending". But the old guy is doing nicely, thank you.

⁴ Though Dawkin's idea does explain quite well why pictures of cats in tiny outfits keep popping up in my social media feed.

⁵ Fashions may also have lineages, but only if we change our frame of reference from the human "victim" to the fashion itself.

General Background Reading

These books and articles are on human culture. There's also a large and growing literature on animal culture, but that's outside the scope of these notes.

Books on cultural evolution

Key early work:

Boyd, R.; Richerson, P.J. (1985). *Culture and the Evolutionary Process*. Chicago: University of Chicago Press.

Readable introductions:

Richerson PJ, Boyd R. (2008) *Not by genes alone: How culture transformed human evolution*. University of Chicago Press.

Mesoudi, A (2011). *Cultural evolution: how Darwinian theory can explain human culture and synthesize the social sciences*. University of Chicago Press.

Henrich J. (2017) *The secret of our success: How culture is driving human evolution, domesticating our species, and making us smarter*. Princeton University Press.

I just got this book by Alberto Acerbi as an e-book, but haven't read it yet. It's getting good reviews:

Acerbi A. (2019) *Cultural evolution in the digital age*. Oxford University Press.

Review articles on cultural evolution

[Mesoudi \(2017\) Pursuing Darwin's curious parallel: Prospects for a science of cultural evolution. Proceedings of the National Academy of Sciences 114, 7853–7860.](#)

[Gray RD, Greenhill SJ, Ross RM \(2007\) The pleasures and perils of Darwinizing culture \(with phylogenies\). Biol. Theory 2 360–375](#)

Online Resources for cultural evolution

https://culturalevolutionsociety.org/story/What_is_Cultural_Evolution

<http://www.dysoc.org/cesmodules/>

<https://alexmesoudi.com/#research>

The evolution of technology

A classic reference by George Basalla, cited by all. There's not much to disagree with in this book, but a great deal of work has been done since it was published.

Basalla G. (1998) *The evolution of technology*. Cambridge, UK: Cambridge University Press.

A more up-to-date review, with a good list of references (at least up to 2015):

Shennan SJ. (2015) Technology, evolution of. In *International encyclopedia of the social & behavioral sciences*, 2nd edn, vol. 24 (eds Smelser NJ, Baltes PB), pp. 129–134. New York, NY: Elsevier.

Languages

Language evolves. There's a lot of interesting work in this area. This is a taster:

[Gray RD, Drummond AJ, Greenhill SJ. \(2009\) Language phylogenies reveal expansion pulses and pauses in Pacific settlement. *Science* 323, 479–483](#)