

Macro- and Micro-Cultural Evolution of Human Law Or The Importance of Being Earnest

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Lady Bracknell: "My nephew, you seem to be displaying signs of triviality."
Jack: "On the contrary, Aunt Augusta, I've now realised for the first time in my life the vital importance of being earnest."
Act III, Part Two
The Importance of Being Earnest by Oscar Wilde, 1898. [The year the Japanese Civil Code was written.]

Evolution of Law is not a triviality!

And I want to be earnest about Cultural Evolution of Law.

CULTURAL EVOLUTION OF LAW

Hypothesis I on Biological Evolution of Law:
Homo's and Pan's (chimpanzee's) common ancestor had genetic/genomic set-up for evolution of law ca. 7 mil. years ago, which, however, was hardly 'activated'. Sometime thereafter, Homo's law evolved.

- While Owen Jones' "Society for Evolutionary Analysis in Law" (<https://www.vanderbilt.edu/sea/>) contributed much, (Biological) Evolution of Law per se, and Cultural Evolution (e.g. Mesoudi 2011) of Law is understudied (with some early exception, e.g. Goodenough 2005).
- We propose new research methods, to pioneer the way to demonstrate (when and) how the macro- and micro-cultural evolution of law took place.

1) MACRO-CULTURAL EVOLUTION OF LAW

- 1-1) We hypothesize (Wada 2021) that within early human hunter-gatherer group of 30 (Hill et al. 2011; Lehmann et al. 2014) to 150 ("Dunbar's number") individuals, "group laws" evolved, shared by, and transmitted to the new members of the group by use of early, spoken language.
- Hypothesis II: Macro-Cultural Evolution of Law started, at the latest, with emergence of early language -- the timing is assumed to be ca. 0.5 mil. years ago.** (see Stout et al. 2018; for human's hierarchical perception, see Sano et al. 2020)
- 1-2) On evolution of norms (Campenni et al. 2014), cooperation and third-party punishment, we base our research on previous literature -- theoretical (Boyd et al. 2003; Bowles & Gintis 2004; Helbing et al. 2010a, 2010b), and empirical (Rand et al. 2011; Jordan et al. 2016). We proceed to the computer simulation analysis of macro-cultural evolution of law.

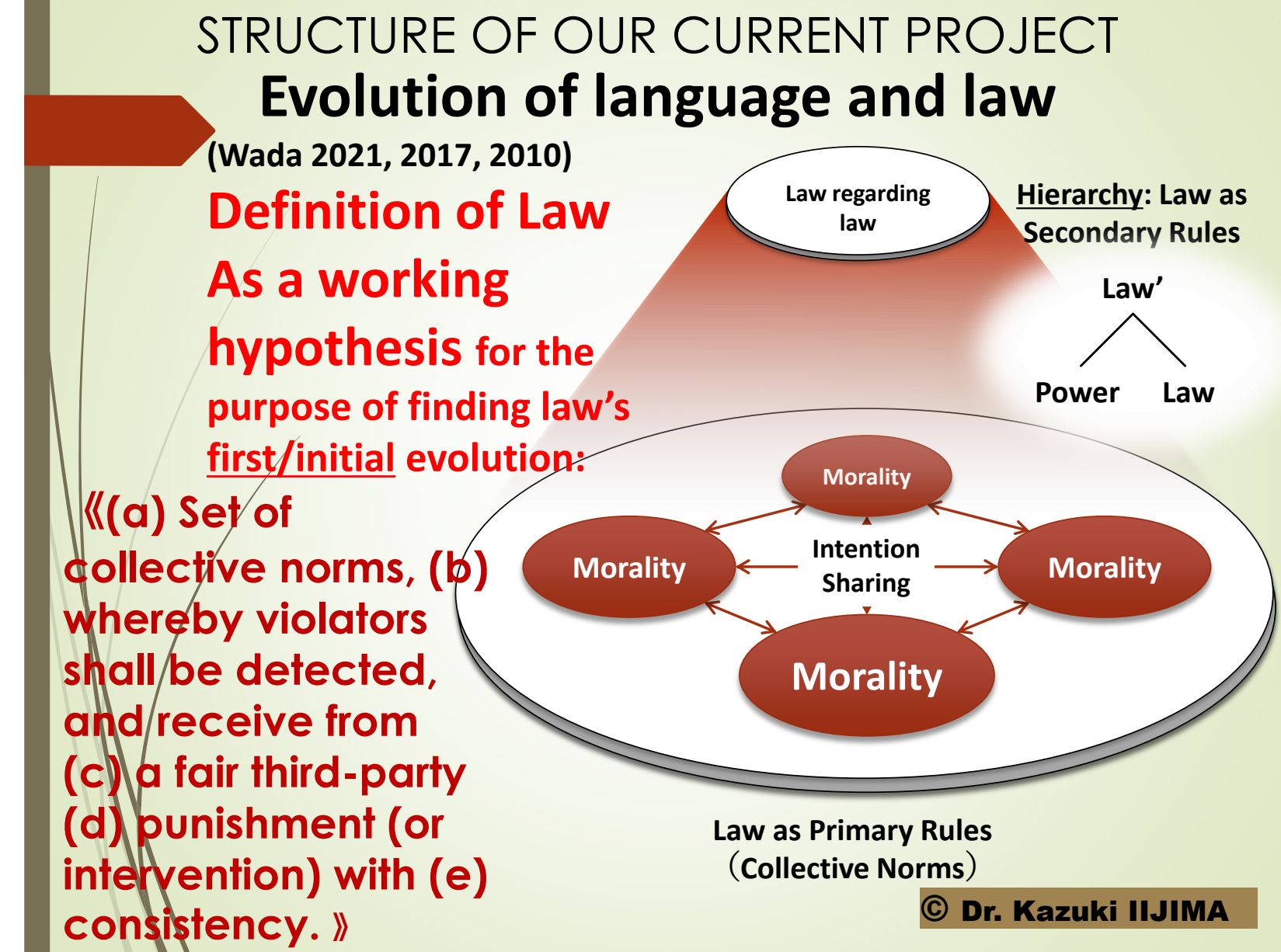
2) MICRO-CULTURAL EVOLUTION OF LAW

Solid Proposition: Micro-Cultural Evolution of Law started, at the very latest, with the oldest written law, ca. 4,000 years ago.

- We proceed to accumulate data set (cf. Bickel et al. 2017's "AUTOTYP" on languages and its use by Matsumae et al. 2020), **possibly by joining the seshat.databank.info**, of early written law from Uruk-Nammu Code, the oldest written code of 2,100 B.C., of medieval Canon law, Islamic law, Japanese laws of 7th-19th centuries, finally of the modern Common Law, Civil, Penal, Commercial Codes and Constitutions of the major countries, depicting what major components (cf. Siems 2016) were newly introduced and transmitted where and when, in the past 4,000 years.

OUTLINE OF TODAY'S TALK

- PART I: LOCATING the MACRO-CULTURAL EVOLUTION OF (non-HUMAN and HUMAN) LAW; WHEN?**
- PART II: LOCATING the MICRO-CULTURAL EVOLUTION OF (HUMAN) LAW; WHEN?**



PART I: LOCATING the MACRO-CULTURAL EVOLUTION OF (HUMAN) LAW; WHEN?

i.e., As a Theoretical Start-up: covering the last 7 million years of possible Evolution of Law

Could these intention sharing, morality and LAW have evolved within chimpanzee groups, who have communications, but NOT language?

Final Say:

Suchak & de Waal, PNAS, 2016

Schmidt and Tomasello (1) propose that third-party interventions must have been food-motivated. However, interveners never obtained any food, which was always long gone before the intervention occurred. Because individuals of all ranks, from the highest to the lowest, intervened, it is unlikely that dominance assertion was a motivating factor. We believe that social norm enforcement best fits our observations.

Schmidt MFH, Tomasello M (2016) How chimpanzees cooperate: If dominance is artificially constrained. Proc Natl Acad Sci USA 113:E6728-E6729.
Suchak M, et al. (2016) How chimpanzees cooperate in a competitive world. Proc Natl Acad Sci USA 113(36):10215-10220.

CHIMPANZEES CAN & DO HAVE LAW

Some chimpanzees in captivity give (c) third-party (d) (not always punishment, but) INTERVENTION with (e) consistency.

i.e., even though they might be "BIZARRE" * chimpanzees (Leavens et al. 2010), the general proposition that chimpanzees do not have law is denied.

* "BIZARRE" Chimpanzees do not represent "the Chimpanzee" (Leavens et al. 2010, Behav. Brain Sci.)
* Barren, Institutional, Zoo, And other Rare Rearing Environments"

PART I: THEORETICAL CONCLUSION

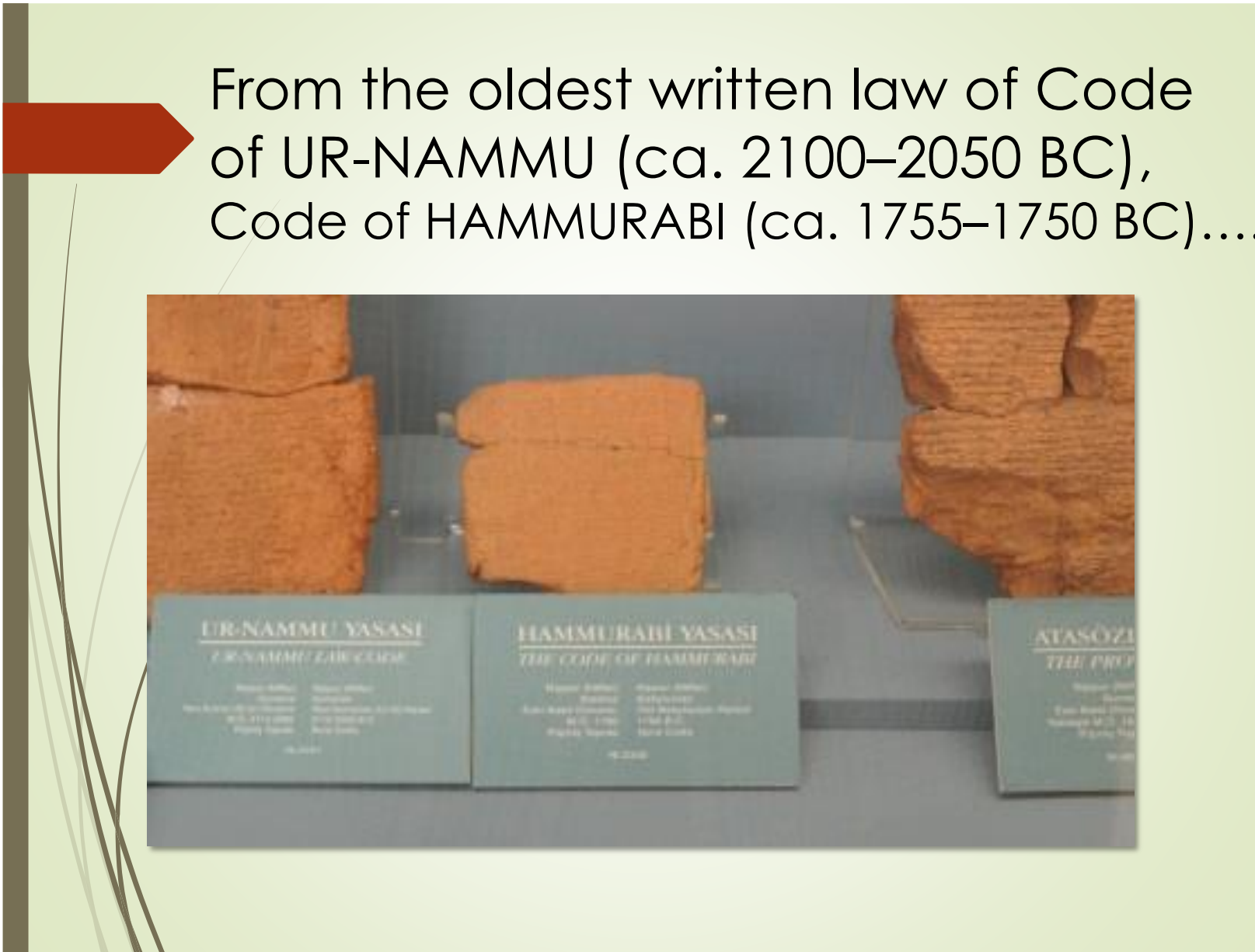
Hypothesis I is more likely to be correct: Our common ancestor had genetic/genomic set-up for evolution of law ca. 7 mil. years ago.

Therefore:

Hypothesis II is also correct: Macro-Cultural Evolution of Law started, at the latest, with emergence of early language -- the timing is assumed to be ca. 0.5 mil. years ago.

PART II: LOCATING the MICRO-CULTURAL EVOLUTION OF (HUMAN) LAW; WHEN?

Solid Proposition:
Micro-Cultural Evolution of Law started, at the very latest, with the oldest written law, ca. 4,000 years ago.



To the modern Constitution (of Japan, 1946):

PREAMBLE: "We, the Japanese people, acting through our duly elected representatives in the National Diet, determined that we shall secure for ourselves and our posterity the fruits of peaceful cooperation with all nations and the blessings of liberty throughout this land, and resolved that never again shall we be visited with the horrors of war through the action of government, do proclaim that sovereign power resides with the people and do firmly establish this Constitution."

LANGUAGE HAS PLAYED A DECISIVE ROLE IN THE MICRO-CULTURAL EVOLUTION OF HUMAN LAW.

IN SEARCH OF ANALYZING THE PROCESS OF THIS MICRO-CULTURAL EVOLUTION:

- Building a Database **possibly by joining the seshat.databank.info**;
- Building a Theoretical Basis; and
- Planning an Experimental Design using "Public Goods Game" for "Neuro-law" Research with fMRI

Seshat website showing datasets and project information.

Document discussing the evolution of law and social hierarchy, mentioning the Tokugawa shogunate and the Edo social hierarchy.

While Building a Database of Written Laws of 4,000 years... (work in trial)

We plan to proceed to accumulate data set of written laws in the past 4,000 years. Cf. Siems 2016 shows examples of 'major components', which are yet unsatisfactory and not convincing -- we intend to maximize these components for our analysis.

Building a Theoretical Basis in Advance (work in progress, for the upcoming fMRI experiment of "Neuro-law")

With previous research, e.g. Helbing et al 2010a, 2010b, which use Public Goods Game (PGG) as an experimental paradigm in mind, this is a work in progress, to build a theoretical basis for our "neuro-law" experiment with PGG.

Non-invasive & Invasive "Neuro-law" Experiments

New Experimental Design Common for TD & Patients: "Public Goods Game" (3 contributors) ← Hints from "Legal Anthropology": Roberts 1979; ★1: "Scarce Resource": of Inuits' housing, food or clothes. ★2: "Unlimited Resource": Does "Tragedy of Commons" (e) happen? ★3: "Limited Resource": Does Tragedy of Commons happen? (e) Nobel Prize Laureate for Economics, Elmer Oster's "Game Theory": Free-riding by the powerful

Does a) Norm emerge, under which of these 3 conditions?

Public Goods Game in fMRI: Drawings by Dr. Ohnuki, Dr. Matsumoto & Dr. Iijima. 4 agents decide how much money each contributes to Public Goods. Total sum of contributions is divided equally & shared to each of the 4.

Rule of the Game & 3 Conditions [1st Experiment] Based on Van Hoorn et al. 2016, 4 participants, including only 1 in fMRI, play "Public Goods Game".

- Yen 500 is given to each at first. Each decides his "contribution" to Public Goods.
- The experimenter sums up the contributions & divide the total into equal share for each.
- For each participant to "survive" at the end of the Game, he must have at least Yen 1,000. If not, that participant should return all his money at hand and "dies".
- ★1: "Scarce Resource": Total resource is Yen 4,000; if the total are divided, "game over".
- ★2: "Unlimited Resource": Total resource is unlimited. (CONTROL conditions is the same.)
- ★3: "Limited Resource": Total resource is Yen 8,000.

We test if the "Norm" emerges so that each shall have at least have Yen 1,000 at the end of the game & if so, what ROI is/are activated. (PREDICTION) (based on Van Hoorn et al. 2016) ROI will be dmPFC, TPJ & STS; and the scale of significant difference: ★1 > ★3 > ★2.

Rules of the PUBLIC GOODS Game (in detail)

- For the 1st round: 1 player is in fMRI, the other 4 are outside of fMRI. Only 2 (incl. 1 in fMRI) out of 5 players are instructed on the "Norm" of the Game, for the initial 10 rounds of game.
- For the 2nd round: the experimenter (as a 6th player) gives "Third-Party Punishment", deducting certain amount of money from the "non-cooperators/defectors (free-riders)" for the next 10 rounds of the game.
- For the 3rd round: for additional 10 games, all the players will be the informed NOT ONLY of the "Norm" of the Game, BUT ALSO constantly of each other's donation amount and cash at hand, through spoken and written language.
- In order to counter-balance, with a separate group of 5/6 players, we will switch the 2nd and 3rd rounds -- information sharing first (2nd round), third-party punishment later (3rd round).

THE THREE CONDITIONS OF "SCARCE RESOURCE", "LIMITED RESOURCE" AND "UNLIMITED RESOURCE" ARE INFORMED IN ADVANCE AS SUCH TO THE PLAYERS AND SEPARATELY APPLIED TO ALL THE EXPERIMENTS (with an uninformed "Unlimited Resource" condition as a CONTROL).

HOW DOES THE SHARED INFORMATION and/or THIRD-PARTY PUNISHMENT AFFECT THE COOPERATION/DEFECTION (Free-Riding) of each player? i.e., How does or does not the "Norm" emerge/evolve?

JSPS Grant-in-Aid (Kakenhi) 18H05085 (Wada as leader)

共創的コミュニケーションのための言語進化学

Evolinguistics: Integrative Studies of Language Evolution for Co-creative Communication

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ESSENTIAL REFERENCES (in alphabetical order of 1st Authors)

- Bellucci et al. 2016: "Effective connectivity of brain regions underlying third-party punishment: Functional MRI and Granger causality evidence." *Social Neuroscience*, 1-11.
- Schacht & Tomasello 1998: "Chimpanzee and Human Children." *Current Anthropology* 39(5): 591-614.
- Buckholtz et al. (2008, 2012 & 2015): "From Blame to Punishment: Disrupting Prefrontal Cortex Activity Reveals Norm Enforcement Mechanisms." *Neuron* 87, 1-12.
- M Campenni, R Conte, G Andrichetto (eds), *Minding Norms: Mechanisms and dynamics of social order in agent societies*, 2014. OUP.
- Ginher et al. 2016 (Sept): "Parsing the Behavioral and Brain Mechanisms of Third-Party Punishment." *The Journal of Neuroscience* 36(36), 9420-9434.
- Goodenough, 2005: "Cultural replication theory and law: Proximate mechanisms make a difference." *Vt. L. Rev.*, 1.
- Gu et al. 2015, *J. Neurosci.* "Necessary, Yet Dissociable Contributions of the Insular and Ventromedial Prefrontal Cortex to Norm Adaptation"
- Helbing et al. 2010a, *PLoS COMPUT BIOL.* Evolutionary Establishment of Moral and Double Moral Standards through Spatial Interactions
- Helbing et al. 2010b, *New J. Phys.* "Punish, but not too hard: how costly punishment spreads in the spatial public goods game"
- Hill, K.R., et al. 2011: "Co-residence patterns in hunter-gatherer societies show unique human social structure." *Science*, 331, 1286-1289. Jordan et al. 2016: "Third-party punishment as a costly signal of trustworthiness." *Nature* 530, 473-476.
- Reuger & Hoffman, 2016: "The Emerging Neuroscience of Third-Party Punishment." *Trends in Neurosciences* 39(6), 499-501.
- Lehmann, J., Lee, P. C., & Dunbar, R. I. M., 2014: "Unravelling the evolutionary function of communities." In Dunbar et al. (Eds.), *Lucy to language: The bonobos papers* (pp. 245-276). Oxford: Oxford University Press.

ESSENTIAL REFERENCES (cont.)

- A. Mesoudi, *Cultural evolution: How Darwinian theory can explain human culture and synthesize the social sciences*, 2011. U. of Chicago Press.
- Riedl, Tomasello et al. 2012: "No third-party punishment in chimpanzees." *PNAS* 109,14824-14829.
- Roberts (1979) *Order and Dispute: An Introduction to Legal Anthropology*.
- Ruff, Ligatus, Fehr, 2013. *Science*. "Changing Social Norm Compliance with Noninvasive Brain Stimulation"
- Tomasello 2008: *Origins of human communication*. MIT Press.
- Tomasello et al. 2013: "Origins of Human Cooperation and Morality." *Annu. Rev. Psychol.* 64:231-255.
- Treadway et al. 2014: "Corticostriatal gating of emotion-driven punishment." *Nature Neuroscience* 17(9), 1270-1275.
- Sano et al. 2020, *PNAS*: "A 1.4-million-year-old bone handprint from Konso, Ethiopia, shows advanced tool technology in the early Acheulean"
- Schillingoff & Moore 2017: "Do chimpanzees conform to cultural norms?" In Kristin Andrews Jacob Beck (ed.), *The Routledge Handbook of Philosophy of Animal Minds*.
- Stout et al. 2018: *BioRxiv*. Grammars of action in human behavior and evolution.
- Suchak & de Waal, 2016: "REPLY TO SCHMIDT AND TOMASELLO: Chimpanzees as natural team-players." *PNAS* 113: 44, 2016
- van Riper et al. 2012: "Intergal Third-Party Interventions in Captive Chimpanzees: A Reflection of Community Concern." *PLoS ONE* 7(1): e30748. doi:10.1371/journal.pone.0030748
- van Riper et al. 2015: "Chimpanzees' Bystander Reactions to Infanticide: An Evolutionary Precursor of Social Norms?" *Human Nature* 26(2), 144-160.
- van M. 2010: "Working out on your fitness? great... but how is our law doing?" *Hagaku Shinin*, 108:2, 45-73.
- Wada M., 2017: "Human social complexity, evolution of (human and non-human) law." In Klappert, P. (Ed.), *Social Complexity: Histories, Processes and Evolution* (pp. 79-79). Cologne, Germany: German Primitals Center.
- Wada M., 2021: "Ritsuryō (Regulation)", In: Oda et al. (Eds.), *Shikwa de wakaru Nihon-kodō no jiten* (Dictionary on Human Behavior and Evolutionary Perspectives), pp.234-236.
- Yoshida et al. 2017: *Sci Rep*. "The Neural Basis of Changing Social Norms through Persuasion".

THANK YOU FOR YOUR KIND ATTENTION!

INTERESTED, OR ANY QUESTIONS? E-MAIL ME!

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