

Macro- and Micro- Cultural Evolution of Law

Or

The Importance of Being Earnest

Mikihiko WADA LL.B., Ph.D

(Faculty of Law, Hosei University, TOKYO)

mwada@hosei.ac.jp

June 2021, at Cultural Evolution Society

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.]**

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/seal/>) 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-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 yeas ago.

- We proceed to accumulate data set (cf. Bickel et al 2017's "AUTOTYP" on languages and its use by Matsumae et al 2020) of early written law from **Uru- Nammu Code, the oldest written code of 2,100 B.C.**, of medieval Canonic law, Islamic law, Japanese laws of 7th-19th centuries, finally of the modern Common Law, Civil, Penal, Commercial Codes and Constitutions of the major counties, 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?**

We shall thus identify macro- and micro-cultural evolution of human law.

STRUCTURE OF OUR CURRENT PROJECT

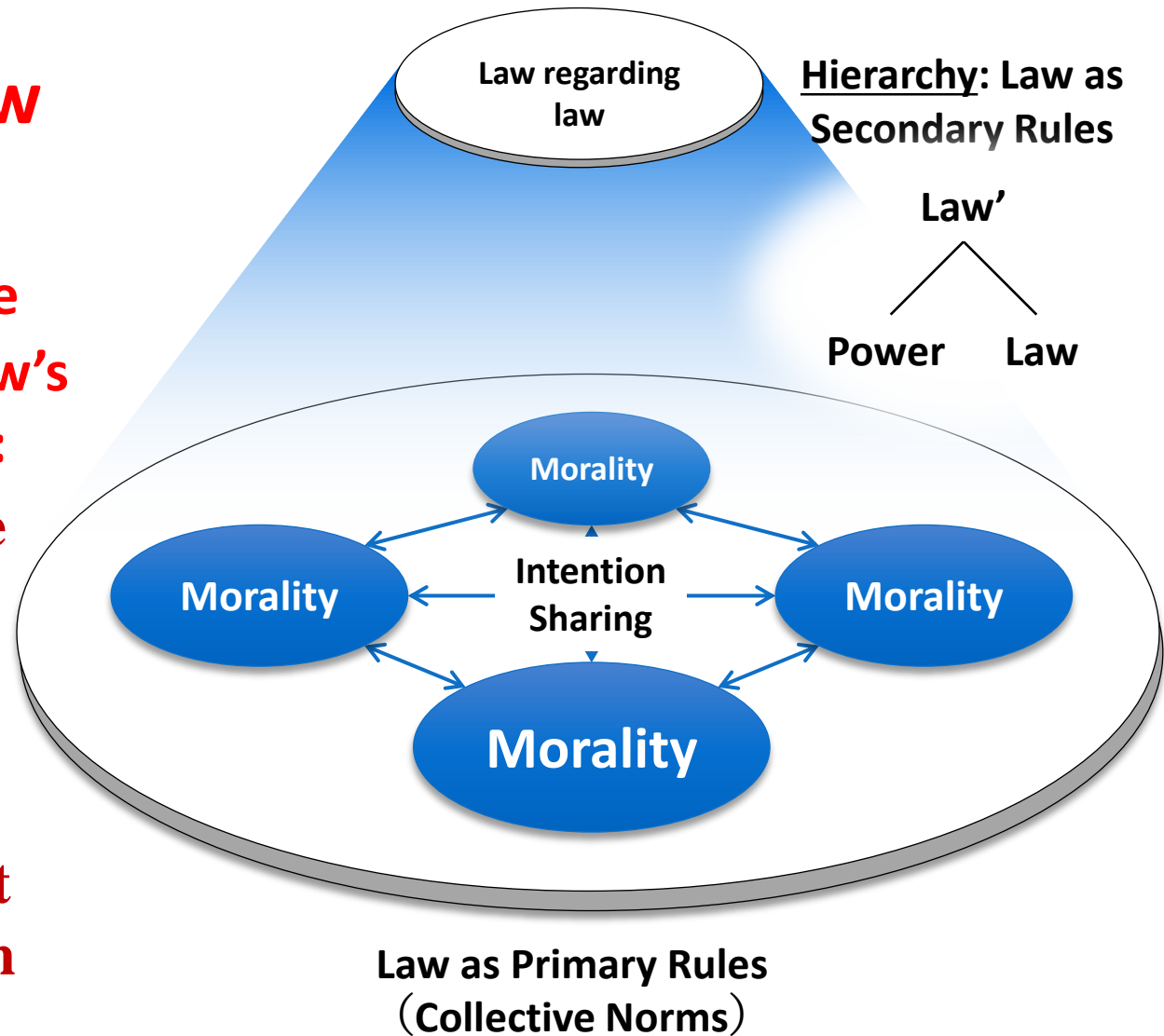
Evolution of language and law

(Wada 2021, 2017, 2010)

Definition of Law

As a working hypothesis for the purpose of finding law's first/initial evolution:

«(a) Set of collective norms, (b) whereby violators shall be detected, and receive from (c) a fair third-party (d) punishment (or intervention) with (e) consistency. »



**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?

a) Norms? Pros and Cons:

Affirmative: von Rohr et al. (2015)

←→ Negative: Schlingloff & Moore (2017)

c) Third-party + d) Punishment?

There are strong pros and cons in a heated debate!

Affirmative: von Rohr et al. (2012);

←→ Negative: Riedl...Tomasello (2012)

(both on chimpanzees in captivity)... but then...

Suchak *et al.*...de Wall, 2016, *PNAS*

and partner choice. To examine if chimpanzees possess the same ability to mitigate competition, we set up a cooperative task in the presence of the entire group of 11 adults, which required two or three individuals to pull jointly to receive rewards. This open-group set-up provided ample opportunity for competition (e.g., freeloading, displacements) and aggression. Despite this unique set-up and initial competitiveness, cooperation prevailed in the end, being at least five times as common as competition. The chimpanzees performed 3,565 cooperative acts while using a variety of enforcement mechanisms to overcome competition and freeloading, as measured by (attempted) thefts of rewards. These mechanisms included direct protest by the target, third-party punishment in which dominant individuals intervened against free-loaders, and partner choice. There was a marked difference between freeloading and displacement; freeloading tended to elicit withdrawal and third-party interventions, whereas displacements were met with a higher rate of direct retaliation. Humans have shown

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.*)

“**B**arren, **I**nstitutional, **Z**oo, **A**nd other **R**are
Rearing **E**nvironments”

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 yeas ago.**

From the oldest written law of Code
of UR-NAMMU (ca. 2100–2050 BC),
Code of HAMMURABI (ca. 1755–1750 BC)....



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;
- Building a Theoretical Basis; and
- Planning an Experimental Design using “Public Goods Game” for “Neuro-law” Research with fMRI

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 "Neurolaw" Experiments

New Experimental Design Common for TD & Patients:

"Public Goods Game" (3 conditions) ← Hints from "Legal Anthropology": [Roberts 1979](#);

★1: "Scarce Resource": cf. [Inuits](#)' housing, food or clothes.

★2: "Unlimited Resource": Does "Tragedy of Commons" (*) happen?

★3: "Limited Resource": Does **Tragedy of Commons** happen?

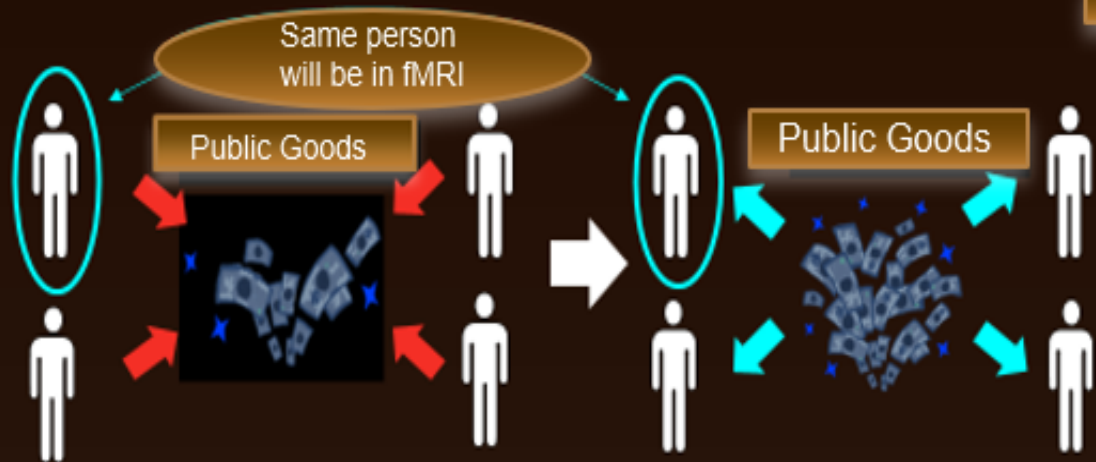
(*) Nobel Prize Laureate for Economics, [Elinor Ostrom's](#) Game Theory = Free-riding by the powerful.



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

Public Goods Game in fMRI

Drawings by Dr. [Ohnuki](#), Dr. [Matsumori](#) & Dr. [Iijima](#)



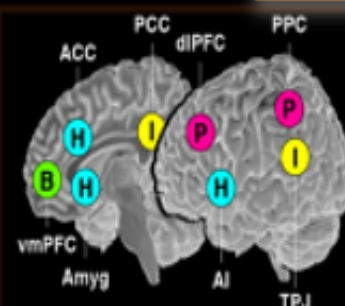
4 agents decide how much money each contributes to Public Goods.

Total sum of contributions is divided equally & shared to each of the 4.

Neuro-imaging of the Brain:

(fMRI/tDCS)

→ Neuro-based multi-agent simulation by Dr. [Iijima](#)



P: Punishment I: Intent
H: Harm B: Blame
Krueger and Hoffman (2016)



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)

- 1) 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.
- 2) 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.
- 3) 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.
- 4) 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).
- 5) THE THREE CONDITIONS OF “SCARE 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?

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.
- Boesch & Tomasello 1998: "Chimpanzee and Human Cultures," *Current Anthropology* 39(5): 591-614.
- Buckholz et al. (2008, 2012 &), 2015: "From Blame to Punishment: Disrupting Prefrontal Cortex Activity Reveals Norm Enforcement Mechanisms," *Neuron* 87, 1–12.
- M Campenl, R Conte, G Andrighetto (eds), *Minding Norms: Mechanisms and dynamics of social order in agent societies*, 2014, OUP.
- Ginther 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.*, .
- Gu et al. 2015, *J Neurosci*, "Necessary, Yet Dissociable Contributions of the Insular and Ventromedial Prefrontal Cortices 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.*12: "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.
- Krueger & Hoffman, 2016: "The Emerging Neuroscience of Third-Party Punishment," *Trends in Neurosciences* 39(8), 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 benchmark 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, Ugazio, 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: "Corticolimbic gating of emotion-driven punishment," *Nature Neuroscience* 17(9), 1270-1275.
- Sano et al 2020, *PNAS*: "A 1.4-million-year-old bone handaxe from Konso, Ethiopia, shows advanced tool technology in the early Acheulean"
- Schlingloff & 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 (AND REFERENCES QUOTED THEREIN).
- von Rohr et al. 2012: "Impartial Third-Party Interventions in Captive Chimpanzees: A Reflection of Community Concern," *PLoS ONE* 7(3), 1-8. von Rohr et al. 2012: "Impartial Third-Party Interventions in Captive Chimpanzees," *PLoS ONE* 7(3), 1-8.
- von Rohr et al. 2015: "Chimpanzees' Bystander Reactions to Infanticide: An Evolutionary Precursor of Social Norms?" *Human Nature* 26(2), 143–160.
- Wada M., 2010: "Working out on your fitness? great...but how is our law doing?". *Hogaku Shirin*, 108:2, 45-73.
- Wada M., 2017. "Human social complexity: evolution of (human and non - human?) law," In Kappeler, P. (Ed.), *Social Complexity: Patterns, Processes and Evolution* (pp. 78-79). Göttingen, Germany: German Primate Center.
- Wada M., 2021. "Rissuru [Regulate]". In: Oda et al (Eds), *Shinka de wakaruru Ningen-kodo no Jiten [Dictionary on Human Behavior from Evolutionary Perspective]*, " pp.234-238.
- Yomogida et al. 2017, *Sci Rep*, "The Neural Basis of Changing Social Norms through Persuasion".

Grants:

- 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



法政大学
HOSEI University



Acknowledgments:

Kenji MATSUMOTO (Tamagawa Univ.), Kaosu MATSUMORI (Univ. of Tokyo);

Kazuki IJIIMA (National Center of Neurology & Psychiatry; Tamagawa Univ.);

David HAIG (Organismic and Evolutionary Biology, Harvard);

Toshikazu HASEGAWA*, Kenji ONISHI*, Takuya TAKAHASHI (U. of Tokyo, 2016* and 2021);

Ryo ODA (Nagoya Inst. of Technology) ; Hiromi MATSUMAE (Tokai U.);

Marco CAMPENNI (University of Exeter); Hugo MERCIER (CNRS; Institut Jean Nicod, Paris)

Yoshiyuki ONUKI (Jichi Medical Univ.), and many, many others !

THANK YOU 
FOR YOUR KIND ATTENTION!

INTERESTED, OR ANY QUESTIONS?
E-MAIL ME!

mwada@hosei.ac.jp