

Lecture 2: You eat what you are



Pascal Gagneux

September 29, 2022

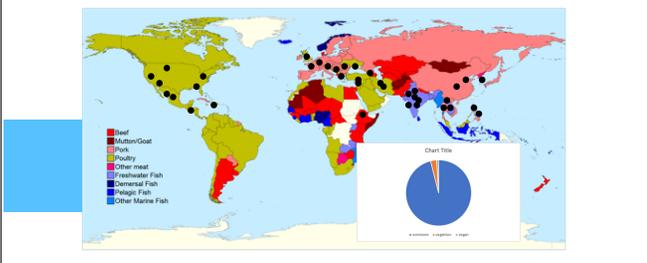
Most surprising way to eat:

facing each other, around weapons and fire!



Most human cultures have rules about sharing food, many people share food around weapons and fire.....

Cuisines represented in this class



Demersal fish refers to: fish that live and feed near the bottom of the sea or lakes

- Indian 9
- Mediterranean 6
- Thai 3
- Korean 3
- Chinese 9
- Filipino 4
- Dolma 3
- Ukrainian 1
- American 4
- Middle Eastern 2

Armanina 1
 Hungarian 1
 Salvadorian 1
 Haitian 4
 Lao 1
 Cambodian 1
 Latin 1
 Afghan 1
 Southern 1
 Greek 2
 Lebanese 1
 German 1
 Ethiopian 1
 European 1
 Are you an omnivore, vegetarian, or vegan Omnivore 97
 Vegetarian 3
 Vegan 1
 Favorite

Dishes yo wish to earn how to prepare

Ramen	Macarons	Tonkatsu Ramen	Dolma (3)
Beet Wellington	pad see ew (2)	and marinated soft-boiled egg	Veggies that actually taste good
Tacos de Birria	Pasta with tofu	Sushi	Armenian bbq
Fried octopus	beef noodle soup	Spring rolls	Korean chicken
Ghormeh Sabzi (2)	Kai Palo	Sopes	Pie from scratch
Salmon Chowder	Fasolijan	Parrot	Sushi
Pupusas	Sukiyaki	Chicken plov	Paelia (2)
Chicken Tikka Masala	Yellow curry over rice	Ramen	Pho (3)
Shepherds Pie	Albondigas	Pasta (5)	Sourdough bread
Pasta with pesto	Miso soup	Lasagna	Chilaquiles
chicken adobo	Taiwanese popcorn chicken	Macaroni and cheese	Charlie bashers
Caramelized pork meat	Croissant	Cheese	Steak
Mole (2)	Tamales	Curry	Shepherds pie
Kare-Kare	Anything spicy- Gochujang	Ratatouille	Tortillas from scratch
Ramen	Sweet and sour pork	Fish tacos tj style	Chinese burger
Bun rieu	Yakitori	Kung pao chicken	Ramen
		Chicken akka masala	Pozole
			Japanese curry

not known to Pascal

existing video in Pascal's kitchen:

Diversity of Primate diets



Primates display a large variety of diets, from the narrow and plant based (tree gum eating marmosets) to the varied, omnivorous diet of chimpanzees who eat hundreds of species of plants, several dozen animals prey species (insects and small mammals) and fungi.

Aquatic foods are relatively rare.

Practice question:

Which type of foods are rare among primates?

Aquatic foods including fish, clams and kelp.

Primate frugivory and omnivory:

color vision, loss of vitamin C synthesis, taste for sweet, salty and fatty
chimpanzees and humans are omnivores

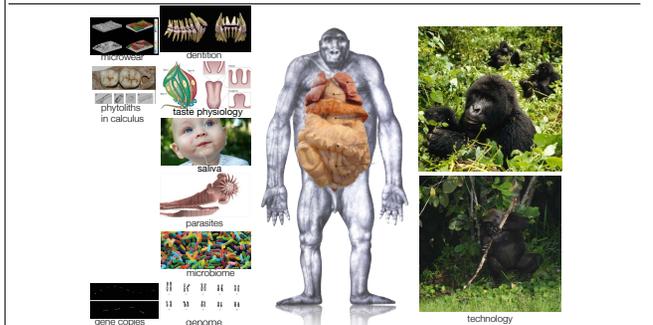


Some apes, such as chimpanzees are omnivorous, like humans.

Practice Question: give two examples of omnivorous non-human primates:

Baboons and chimpanzees.

Evidence of dietary adaptations



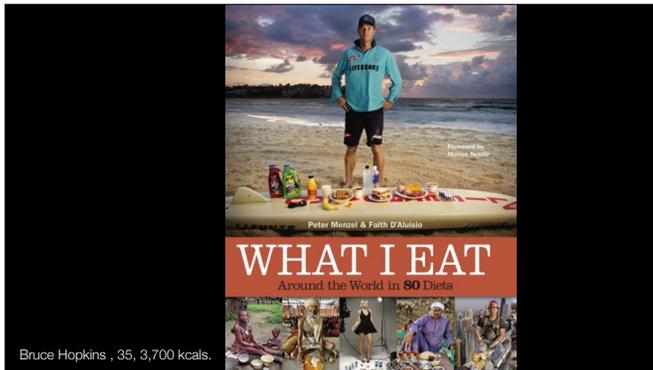
Diets shapes many aspect of each animal, from dentition, to physiology and microbiome.

Practice question: Give four different adaptations to primate diet:

Tooth size, tooth shape, gut anatomy, microbiome, genome, saliva composition ..

Reconstructing past diets?

Comparative studies physiology, behavior and anatomy:
teeth: size, shape, micro wear and composition
dental calculus
Stable isotopes
coprolites
archeology
comparative genetics



Bruce Hopkins , 35, 3,700 kcals.

"Bruce Hopkins, a Bondi Beach lifeguard, with his typical day's worth of food in Sydney, New South Wales, Australia. The caloric value of his day's worth of food on a typical day in the month of February was 3,700 kcals. He is 35 years of age; 6 feet tall, and 180 pounds. Hopkins eats moderately, rarely -- if ever -- eats fast food, and drinks alcohol only when he and his wife go to dinner with friends."

In this fascinating study of people and their diets, 80 profiles are organized by the total number of calories each person puts away in a day. Featuring a Japanese sumo wrestler, a Maasai herdsman, world-renowned Spanish chef Ferran Adria, an American competitive eater, and more, these compulsively readable personal stories also include demographic particulars, including age, activity level, height, and weight. Essays from Harvard primatologist Richard Wrangham, journalist Michael Pollan, and others discuss the implications of our modern diets for our health and for the planet. This compelling blend of photography and investigative reportage expands our understanding of the complex relationships among individuals, culture, and food.



Saleh Abdul Fadlallah, 40, 3,200 kcals

Camel broker Saleh Abdul Fadlallah in Egypt is 40 years old, 5 foot 8, and weighs 165 pounds. His intake of calories on a typical April day was 3,200 kcals. His menu: eggs with butter, fava beans, country bread, potato chips, feta cheese, soup, rice, black tea, etc.

Photos by Peter Menzel from "What I Eat: Around The World In 80 Diets" by Menzel and Faith D'Aluisio



Noolkisaruni Tarakuai, 38, 800 kcals

Noolkisaruni Tarakuai, the third of four wives of a Maasai chief near Narok, Kenya. She is 38 years old, 5 foot 5 and 103 pounds, and consumed 800 calories on a typical January day. She is photographed here with her day's worth of food: largely maize meal and milk.



Felipe Adams, 30, 2100 kcals

Felipe Adams, a 30-year-old Iraq war veteran with his parents and a typical day of food at their home in Inglewood, Calif. He is 30 years old; 5 foot 10 and weighs 135 pounds, and his typical day of calories added up to 2100. Adams was paralyzed by a sniper's bullet while serving in Baghdad, Iraq. His diet includes oatmeal, a chicken sandwich, yogurt, chicken breast and yogurt.



Willie Ishulutak, 29, 4,700 kcals.

"Willie Ishulutak, an Inuit soapstone carver in Iqaluit, Nunavut, Canada with one day's typical food, and drink. The caloric value of his day's worth of food on a typical day in the month of October was 4,700 kcals. He is 29 years of age; 5 feet, 9 inches and 143 pounds. Carving is one of the few traditions of the Inuit that has made the leap into the wage-earning modern world. Willie says he can complete two or three pieces in a day, then sell them in the evening at bars and restaurants in Iqaluit for \$100 (\$93 USD) each, and sometimes more."



Head monk, 45, 4,900 kcals.

The head monk at his partially rebuilt monastery with a typical day's worth of food in the Tibetan Plateau. He is 45, 5 foot 5, 158 pounds, and his day of calories in June was 4,900 kcals. His food: butter tea, barley flour cake, dried cheese curds, noodle soup with potato, etc.



Sitarani Tyaagi, 70, 1,000 kcals.

Sitarani Tyaagi, an ascetic Hindu priest, with his typical day's worth of food at an ashram in Ujjain, India. The caloric value of his typical day's worth of food in the month of April was 1,000 kcals. He is 70 years of age; 5 feet, 6 inches tall; and 103 pounds. Sitarani Tyaagi is one of thousands of ascetic Hindu priests -- called Sadhus -- that walk the country of India and receive food from observant Hindus. Generally, he eats one meal per day and has water for the other two meals. He has a small pot that he carries with him for water. Offer him more food than a plateful, and he will kindly say, 'no thanks.'"



Curtis Newcomer, 20, 4,000 kcals

Curtis Newcomer, a U.S. Army soldier, with a typical day of food at the National Training Center at Fort Irwin in California's Mojave Desert. He is 20 years old, 6 foot 5 and 195 pounds; his caloric intake on a typical day in September was 4,000 kcals. His lunch consists of a variety of instant meals in the form of MREs (meals ready to eat). His least favorite is the cheese and veggie omelet.



Peter Menzel, from the book, "Hungry Planet: What the World Eats."

Bhutan: The Namgay family of Shingkhey Village. Food expenditure for one week: 224.93 ngultrum or \$5.03. Family recipe: Mushroom, cheese and pork.



Different families around the world with the foods and drinks they consume in one week.

United States: The Revis family of North Carolina. Food expenditure for one week: \$341.98. Favorite foods: spaghetti, potatoes, sesame chicken.

UK: The Bainton family of Cllingbourne Ducis. Food expenditure for one week: 155.54 British Pounds or \$253.15. Favorite foods: avocado, mayonnaise sandwich, chocolate fudge cake

Japan: The Ukita family of Kodaira City. Food expenditure for one week: 37,699 Yen or \$317.25. Favorite foods: sashimi, fruit, cake, potato chips.

Mexico: The Casales family of Cuernavaca. Food expenditure for one week: 1,862.78 Mexican Pesos or \$189.09. Favorite foods: pizza, crab, pasta, chicken.

Italy: The Manzo family of Sicily. Food expenditure for one week: 214.36 Euros or \$260.11. Favorite foods: fish, pasta with ragu, hot dogs, frozen fish sticks.

China: The Dong family of Beijing. Food expenditure for one week: 1,233.76 Yuan or \$155.06. from Book "Hungry Planet"



Kuwait: The Al Haggan family of Kuwait City. Food expenditure for one week: 63.63 dinar or \$221.45. Family recipe: Chicken biryani with basmati rice.

Turkey: The Celiks of Istanbul - Food expenditure for one week: 198.48 New Turkish liras or \$145.88. Favorite Foods: Melahat's Puffed Pastries.

Mongolia: The Batsuuri family of Ulaanbaatar. Food expenditure for one week: 41,985.85 togrogs or \$40.02. Family recipe: Mutton dumplings.

Australia: The Browns of River View - Food expenditure for one week: 481.14 Australian dollars or US\$376.45. Family Recipe: Marge Brown's Quandong (an Australian peach) Pie, Yogurt.

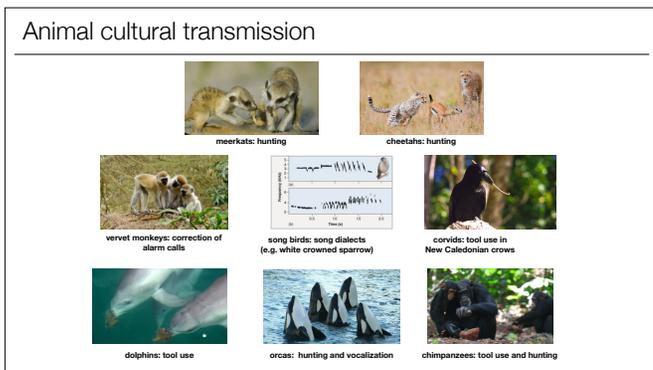


Chad: The Aboubakar family of Breidjing Camp. Food expenditure for one week: 685 CFA Francs or \$1.23. Favorite foods: soup with fresh sheep meat.

India: The Patkars of Ujjain - Food expenditure for one week: 1,636.25 rupees or \$39.27. Family Recipe: Sangeeta Patkar's Poha (Rice Flakes).

Equador: The Ayme family of Tingo. Food expenditure for one week: \$31.55. Family recipe: Potato soup with cabbage.

Mali: The Natomos of Kouakourou - Food expenditure for one week: 17,670 francs or \$26.39. Family Recipe: Natomo Family Rice Dish.



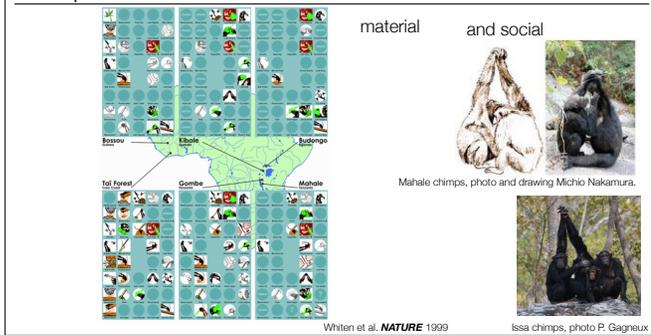
Animals actively teaching, very few examples if any from apes. Transmission of learned behaviors is one definition of culture.

Practice question:

Name three mammal species that have cultural transmission.

Dolphins, Orvas, and chimpanzees.

Chimpanzee culture



Chimpanzee cultures across tropical Africa: Behaviors are arranged in the 5 times 8 arrays to cluster those behaviors customary or habitual at each site, with clusters for westerly sites on the left of the array and clusters for easterly sites on the right. The secondary Mahale site (K) is omitted. Color icons, customary; circular icons, habitual; monochrome icons, present; clear, absent; horizontal bar, absent with ecological explanation; question mark, answer uncertain.

Chimpanzee culture



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The origin of ratcheting culture

- Efficient transmission of novel ideas.
- High-fidelity transmission (Conformism).
- Innovation.
- Balance between innovation and conservation.
- Socio-cognitive processes including teaching through verbal instruction, imitation, prosociality, and the creation of meaning.

Kurzban & Barrett *Science* 2012

Building on others' ideas, tinkering and innovating while also conforming to a certain degree. Language does wonders to sharing ideas.

From Oldowan stone tool, to Acheulean hand axe, to hafted arrow points, pottery, glass, microchips and photovoltaic panels, all different uses of silicate minerals!

Practice question:

What is a key difference between human culture and other animal cultures?

Human culture is cumulative (ratcheting).

Apes have culture but do not know it

Jourdain Hypothesis :
 "Par ma foi il y a plus de quarante ans que je dis de la prose sans que j'en sache rien, et je vous suis le plus obligé du monde de m'avoir appris cela."
 M Jourdain, Le Bourgeois-Gentilhomme, Acte II, scène 4, Molière (1670).
 [By my faith! For more than forty years I have been speaking prose without knowing anything about it, and I am much obliged to you for having taught me that." M Jourdain, The Middle-class Gentleman, Act II, scene 4, Molière (1670) The Gutenberg Project, translation by Philip Dwight Jones]



Table 2 | Summary of the different stages of representations involved in the cultural process and their presence in humans and great apes, according to current knowledge

Representational stage	Species	Human	Non-human great apes
Primary template mental representation		Present	Present (e.g., spatial memory, see Jarman et al., 2010)
Re-representations		Present	Present at the perceptual level but experiments needed to explore the conceptual level (Trusler and Santos, 2007; Rus and Santos, 2010)
- Categorization		Present	Presently present (Trusler, 2005; Holster et al., 2014) but experiments needed to explore their extent
- Representation of techniques		Present	Understanding of different models (Trusler et al., 2011) group identity present but no group-mindedness (Trusler and Zuberbühler, 2012; Schickel et al., 2015)
- Representation of practitioners		Present	Present (Call and Tomasello, 2008)
Metarepresentation of cultural beliefs		Present	Absent (Call and Tomasello, 2008)

Lack of Metarepresentation of cultural beliefs

Gruber et al. 2015 *Frontiers in Psychology*

Mental state attribution! The highest stage of metarepresentational process, in our context, is to appreciate that members of another group may harbor beliefs that are different from one's own group, that is, to compare 'how things ought to be' (Figure Figure3C3C). Here, cognition goes beyond simple re-representations, which could sustain all previous aspects of cultural knowledge, i.e., categorisation, representation of techniques, and representation of models. In effect, the metarepresentational processes must become 'representations of representations', that is metarepresentations. In humans, this type of metarepresentation probably underlies complex mental state attribution, intentional teaching and belief-based imitation, the human 'theory of mind' (Tomasello et al., 2005 and comments; Meltzoff, 2007). The ability to mentally represent and compare own and others' knowledge may refine the categorisation of partners as 'same' or 'other.' Such reasoning, if associated with feelings of group identity, appears to be an ingredient for the emergence of social norms. Humans have an urge to conform to the behavior of others, but to perceive group behavior as normative and recognize deviation, it is also necessary to mentally represent the group norm, 'the way things ought to be.' Humans tend to become aggressive toward non-followers, while positive reinforcement also plays a role, for instance, in the case of the 'chameleon effect,' when individuals engaged in an interaction unintentionally match each other's behaviors (Chartrand and Bargh, 1999). How this effect connects to norms, however, remains to our knowledge to be investigated. The theory of mind of great apes, in contrast, appears to be more limited and unable to take into account others' false beliefs, suggesting that their metarepresentational abilities are equally limited (Call and Tomasello, 2008).

Conformism and Norm

Swiss Meta-representation of cultural beliefs



1. We have always done it like this.
2. We have never done it like this.
3. If you do it differently, then anyone could do so.

Conservative attitudes have many **merits**: they maintain traditions alive and preserve ancient wisdom

and many **dangers**: they perpetuate injustice and prejudice.

Progressive attitudes also have many **merits**: they introduce new concepts and solve old problems and many **dangers**: they dissolve tried and true practices, they replace old problem with newer bigger problems



peeling garlic a clove at a time or in bulk

The human ecological niche:
CULTURE C. Loring Brace 

- Non-biological inheritance system.
- An institutional sphere devoted to the making of meaning.
- Rapidly evolving.
- Transmitted in all directions: 
- Human biology: profoundly embedded in culture and shaped by culture.

A new type of ecological niche: ratcheting/cumulative cultures - both technical and social!

Transmission of ideas

Incremental change

Modifying/building on existing ideas

Spread in all directions

Strong norms

Reflexive: cultures reflect on themselves

Practice question:

What is one of the key difference between biological evolution and cultural evolution?

During cultural evolution, ideas can be transmitted in all directions, from old to young, from young to old and across social groups, during biological evolution, genetic material is only transmitted from parents to offspring.

Biological enculturation?

	BIOLOGY	CULTURE	
<div style="display: flex; align-items: center;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg); font-size: small; margin-right: 5px;">past</div> <div style="flex-grow: 1; border-left: 1px solid black; border-right: 1px solid black; margin: 0 5px;"></div> <div style="writing-mode: vertical-rl; font-size: small; margin-left: 5px;">recent</div> </div>	Hand anatomy	Complex tool manufacture and use	
	Shoulder anatomy	Projectile weapons	
	Pro-social psychology	Complex social structure and networks	
	Post-reproductive survival	Cultural transmission/grandmothers	
	ARH (aryl hydrocarbons receptor) gene mutation	Use of fire	
	Gene expression levels & gene evolution in liver	Cooking	
	Jawtooth morphology & anatomy	Cooking	
	Hyperactive Immune Responses	Home Bases	
	Liquid saliva	Spoken language	
	Brain anatomy, arcuate fasciculus	Language	
	Social blushing	Cultural norms	
	Delayed development and brain maturation	Cultural transmission	
	Genomic architecture of populations	Cultural mating patterns	
	Body lice	Clothing	
	Lactase persistence	Animal milk use	
	Salivary amylase gene number	Grain agriculture	
	PDE10A expression levels & large spleen	Submarine hunting	
	Malaria resistances	Agriculture created novel niches for mosquitoes	
Sucrase/isoamylase gene function loss in some Inuit	Culture mediated colonization of the arctic		
Thrifty genes (e.g. PPARGC1A) in Polynesians	Long distance marine expeditions		
Germ line mutation rate	Older parental age		

running list of evidence for biological enculturation

Practice question:

Give two examples of human biological features that reflect cultural activity:

Human hand anatomy and human jaw/tooth anatomy.

Distribution of "Great Apes": and Humans



Evolutionary relationships based on DNA comparisons

Humans occupy an ecological niche larger than those of all other (300) species of primates combined.

Two ape species are more closely related to humans than to any of the other apes.

Vanishing ape populations retain more genetic diversity than all humans.

Each of the apes exist in more than one species, despite their very limited ranges, humans only a single species.

Practice question:

What is the most striking difference in the geographic distribution of humans and the great ape species?

Great apes are restricted to tropical forests, humans live everywhere.

The Human Beast

Just another ape: all aspects of humans exist in other species, especially primates.



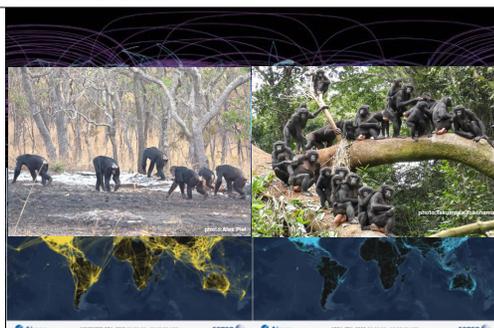
Human exceptionalism: unique processes operating only in human evolution.



People who state that humans are not a kind of ape have not spend enough time observing apes.

People who say that humans are just like all the other apes have spent too much time with apes.....

Global behavior: air traffic



culmination over over 100,000 years of modern human behavior

Its not just the missing chime planes.. Chimpanzee males never leave their native community and jealously guard it.

Our global behavior comes with cost: Global Warming and what happens when you drop a chimpanzee virus into the network...Global HIV/AIDS epidemic

Alex Piel Issah chimpanzees

Takumasa Yokohama Wamba bonobos

Thought Experiment: flight from LAX to ZRH
with 300 male chimpanzees



How many of these male chimpanzees would still be alive after the flight?

Before you get too positive about our species



Hiroshima, 1945
>100,000 dead



NYC, 9/11, 2001
~3000 dead

Humans can exhibit great discipline and civility towards unrelated individuals, but we can also do terrible things using airplanes!

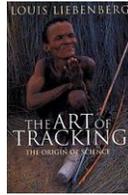
Uniquely human customs



There are thousands of behaviors that have only ever been observed in humans: open any lexicon and start with the letter A.....

This being said, animals including invertebrate insects have had agriculture for millions of years (termites and leaf cutting insects), have kept pets (ants keeping aphids), have built giant structures that include natural air conditioning (termites), have invented weaving (weaver birds), pottery (daubing wasps) and are capable of conveying information removed in time and space (honey bee dance).

Do other species read tracks?



No!
Why not!

Sikwezi a Hadza man reading tracks of his tribe member Philemon and inferring correctly that he must have hunted a zebra, before the local Datoga pastoralists came through with their cattle.

Practice question:

What is the fundamental difference between a dog tracking another animal and humans tracking by reading tracks?

The dog perceives scent molecules, while humans infer from tracks in the ground.

The socio-cultural niche

- Shared Symbols
- shared representations
- Personal Names
- Kinship Terms
- Tribes
- Shared Rituals
- Dance & Music
- Sacred Spaces
- Group Identity
- Increased capacity to cooperate with and compete against other groups.



Socio-cultural winning App: no personal names, no language, no reputation!

CULTURE (Indo-European)



from cultura: growing, cultivating (Neolithic)

Looking up the word for culture in a small sample of different language families reveals: different views of culture and reflexiveness of human cultures.

Utamaduni (Bantu)

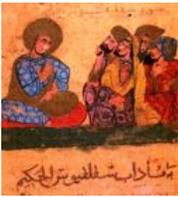
Πολιτισμός



from مدينة (Madina) Arabic for "city", Urbanity, Culture

Culture related to urban centers?

ثقافة (Afro-Asiatic) thaqafa



etymology from: instructing, teaching, educating

Culture related to teaching and education?

Paleolithic Culture: "primitive"?

no writing system

no farming

no currency / market economy

no towns

YET all profoundly cultural!

Contrasting European Views on the Past



"No arts; no letters; no society; and which is worst of all, continual fear, and danger of violent death: and the life of man, solitary, poor, nasty, brutish and short."

Thomas Hobbes 1588- 1676

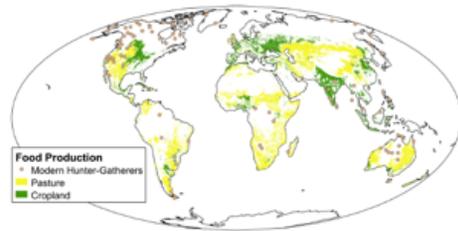


"Civilization is a hopeless race to discover remedies for the evils it produces."

"Nature made me happy and good, and if I am otherwise, it is society's fault."

Jean Jacques Rousseau 1712-1778

Living Foragers and their Plight



Gatherer-Hunters!

data from Navin Ramankutty and Ohio State University Hunter-Gatherer Wiki

Modern agriculture and hunter-gatherers. Map shows area used for major agricultural and pastoral production in 2000, and locations of societies that have depended on hunting and gathering for a significant portion of their food in the modern era. data from Navin Ramankutty and Ohio State University Hunter-Gatherer Wiki

Last Living Hunter Gatherers/Foragers



Ache, Paraguay



Himba, Namibia



Pirahã, Brazil



Khoisan, Botswana



Penan, Malaysia



Jarawa, Andaman Islands



Pila Nguru, Australia



Inuit, Arctic



Shuar, Ecuador



Tsimane, Bolivia



Aka, DR Congo



Hadza, Tanzania

The cumulative knowledge and wisdom held by members of these last groups of foragers is incredibly precious for all humanity!
Also, no vegetarians among them.

文化 (Sinotibetan) wén huà



The intricate patterns of 2,500-year-old tattoos - some from the body of a Siberian 'princess' preserved in the permafrost - have been revealed in Russia. The remarkable body art includes mythological creatures and experts say the elaborate drawings were a sign of age and status for the ancient nomadic Pazyryk people, described in the 5th century BC by the Greek historian Herodotus. But scientist Natalia Polosmak - who discovered the remains of ice-clad 'Princess Ukok' high in the Altai Mountains - is also struck about how little has changed in more than two millennia.

Sanskrit (Indo-European)



from संस्कृति Sanskrit saṃskṛta 'composed, elaborated,' from sam 'together' + kr 'make' + the past participle ending -ta

Elaborated, composed: such things would not leave any fossil traces!!

Teko (Tupi-Guarani, South Amazon)



custom, mode of being

Custom, mode of being. Cultural anthropologists would insist that human culture is a system for the creation of meaning.

Social versus Natural Science perspectives:

practices,
representations
meanings
social forces

Social sciences
cultural relativism

behaviors
wants
beliefs
biological forces

Neuroscience
Ecology

Human beings are born, develop, live their lives and die smack in the middle of the two very different forces.

Blindspot: Cooking, no biological effects?

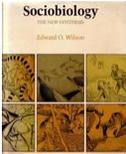


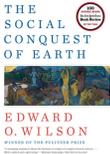
Claude Lévi-Strauss, one of the most influential Anthropologists of all times published on cooking, but strongly doubted that cooking would have a biological effect!
Sociocultural anthropology can be as blind to biology as biology is blind to human culture.....

Blindspot: Language, no effects on prosocial behavior?



Edward O. Wilson







Bill Hamilton

Explaining human prosocial behavior by kin selection and reciprocal altruism.
Humans exhibit many prosocial tendency and engage in costly third party punishment for enforcing social norms.

Famous sociobiologists including Edward Wilson and Bill Hamilton tried to understand human behavior without paying much attention to cultural forces (language, reputation & belief systems).

Mutual accusation of blindsight between social and natural scientists might fall not this category.

Comparative Primatology moment

"Nyani haoni kundule – huiiona la mwenziwe"
The baboon does not see its behind – but regularly sees those of others.

Swahili Proverb



Overcoming the great wall between social and natural sciences

"Nothing in biology makes sense, except in the light of evolution."
(Theodosius Dobzhansky)

American Biology Teacher, 1983,35(2): 125-129

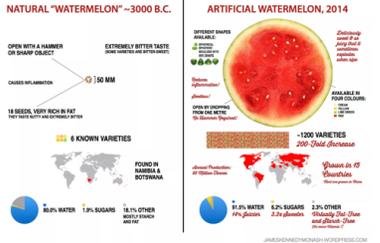


"Human evolution cannot be understood as a purely biological process, nor can it be adequately described as a history of culture. It is the interaction of biology and culture.

"There exists a feedback between biological and cultural processes".
(Theodosius Dobzhansky)

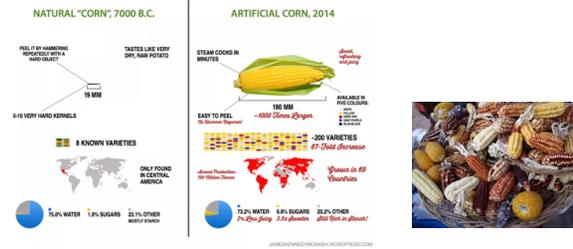
Mankind Evolving, p. 18, 1962

Human-made Watermelon



Among the many things only humans do: selective breeding of crops such as watermelons: in 5000 years from a small dry fruit the size of bead to giant juicy and seedless watermelons.

Human-made Corn



Among the many things only humans do: selective breeding of crops such as corns: in 9000 years from a tiny cob with a few tiny kernels to hundreds of varieties of corn with giant juicy, starch and oil rich cobs. Like most living organisms, the genome of plants contains mobile DNA elements or “jumping genes”. These generate novelty each generation and provide important new variation for plant breeders to select from.

Genes for behavior?

Bottom-up determinism.

Complex interplay between biology and culture!

Cultural inheritance

- Estimates for the heritability of “intelligence” dropped from above 80% to single digits. Feldman and Ramachandran, *Philos Trans R Soc Lond B Biol Sci*. 2018
- Cultural transmission from parent to offspring can mimic genetic heritability. Cavalli-Storza and Feldman, *Am J Hum Genet*. 1973.
- Extreme polygenicity: “typical human behavioral trait associated with very many genetic variants, each of which accounts for a very small percentage of behavioral variability” —> **omnigenicity**. Boyle et al. *Cell* 2017.

A new type of ecological niche: ratcheting/cumulative cultures, both technical and social!

Human spirit freed from biology?

Modern humans are free to shape their destiny.

Cultural impact on biology and biological impacts on culture!

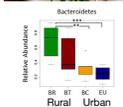
Claude Lévi-Strauss, one of the most influential Anthropologists of all times published on cooking, but strongly doubted that cooking would have a biological effect!
Sociocultural anthropology can be as blind to biology as biology is to human culture.....

Biology through Culture

- *Toxoplasma gondii* infection causes changes in risk-taking behavior. Flagr *Schizophr Bull.* 2007



- Life in cities affects the composition of your microbiome and several health parameters. Gupta et al. *Front Microbiol.* 2017



- Milk consumption by adults selected for lactase persistence at least twice. Tischkoff et al. *Nature Genetics* 2006



Biology and Culture affecting each other.

Would you eat this?



Natto (soy beans fermented with *Bacillus subtilis*), Kefir, a **sybiotic community of bacteria and yeast (SCOBY)**, Sauerkraut, Yamaimo (mountain yam) Kombucha with SCOBY, Miso:soy beans fermented with fungus *Asparagillus oryzae*, wine making using human feet, century/thousand year eggs.

Kefir: composition of SCOBY: the grains were predominantly composed of Lactobacillaceae, which accounted for >50% of the populations in all but grain Ir6. The other major family were the Proteobacteria-associated Acetobacteraceae. Other families detected were Streptococcaceae (19 grains), Leuconostocaceae (4 grains), Lachnospiraceae (16 grains), Ruminococcaceae (8 grains), Bifidobacteriaceae (2 grains), Clostridiaceae (2 grains), Propionibacteriaceae (2 grains), Bacteroidaceae (2 grains), Enterococcaceae (1 grain) and Rikenellaceae (1 grain) fungal

Ascomycota, the largest phylum of the fungal kingdom. Ascomycota were also shown to dominate within the kefir milk, ranging from a high of 100% in Ger1 to a low of 89.38% in Ir10 (Table S6; Table S7). Basidiomycota, the other phylum belonging to the subkingdom Dikarya, was found in 9 milk samples at relatively low read numbers. 9 of the milk samples also harboured trace amounts of uncultured fungi. The lower diversity in the grain is again evident at the family level where all but one sample (Sp1) contain >99% Saccharomycetaceae. The overall average proportion of Saccharomycetaceae is significantly lower in the milks ($p < 0.001$), but still correspond to >99% of reads in 16 of the 23 samples. The fungal

composition of kefir milk Sp1 was unusual by virtue of containing 34.27% Pichiaceae. In contrast, the next highest proportion of Pichiaceae was 0.48% (in milk UK3). Other fungal families detected in both the kefir milks and grains were Davidiellaceae and Trichocomaceae. Herpotrichiellaceae, Teratosphaeriaceae, Valsaceae, Debaryomycetaceae, Phaffomycetaceae, Malasseziaceae, Bondarzewiaceae, Dermataceae, Pezizaceae, Ganodermataceae, Tricholomataceae, Tremellomycetes. In addition, Wallemiomycetes were only detected in the milks whereas Dothioraceae were only detected in the grains.

Would you eat this?



Cambodia



Papua New Guinea



USA



Thailand



Chile



Barcelona

select Cambodian insects on rice paddies, sago palm grub skewers, honey bee larvae in comb, ant eggs, “piure” tunicates (marine invertebrates), dungeness crab with snails.



Would you eat this?



Europe



West Africa



Vietnam



Norway

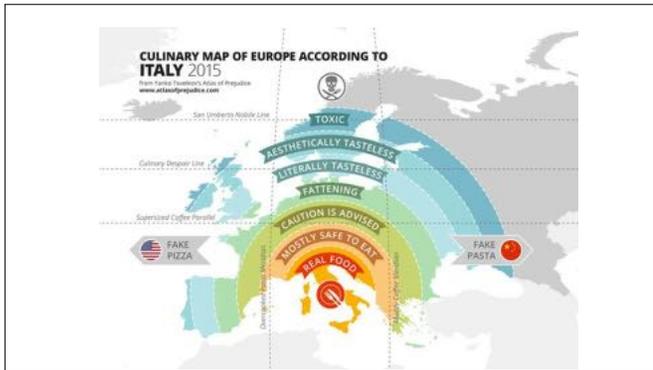


Tanzania



Korea

Horse meat in France, dolphin meat in West Africa, dog meat in Vietnam, whale meat in Norway, Impala (antelope) gut content in Tanzania, living octopus in Korea.



atlas of prejudice contain plenty of food related entries.....

Italy centric



Atlas of prejudice contain plenty of food related entries.....

France centric

