



THE GENES OF GENESIS

original sin and gene-culture co-evolution

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WHAT IS IT WITH HUMANS?

IS SOMETHING WRONG WITH THE HUMAN SPECIES?

... AND WHAT WOULD BE THE "RIGHT" KIND OF HUMAN,
ANYWAY?

HUMAN NATURE HAS PERPLEXED HUMANS FOR CENTURIES



“What a chimera, then, is man! What a novelty! What a monster, what a chaos, what a contradiction, what a prodigy! Judge of all things, imbecile worm of the earth; depositary of truth, a sink of uncertainty and error; the pride and refuse of the universe!”

-- Pascal, *Pensées*, 434

“Selfishness is inborn in human nature; once it expands, dispute follows and modesty falls; jealousy is inherent in human nature; once it extends, conspiracy forms and sincere advice loses.”

– Hsun-Tzu 荀子, ca. 300 BCE



“Human nature is the problem ... we are made of crooked timber.”

-- Steven Pinker, *Is the world getting better or worse? A look at the numbers* (TED talk)

THE BOOK OF GENESIS TELLS US ABOUT ADAM AND EVE

- The first man and woman had a close relationship with God in Eden
- But then they disobeyed God
- They ate from the “Tree of Knowledge of Good and Evil” (Gen 2:17)
- Their “eyes were opened” (Gen 3:7)
- God said, “The man has now become like one of us, knowing good and evil.” (Gen 3:22)
- God expelled them from Eden, so they would not eat from the Tree of Life and live forever (Gen 3:23)



INTERPRETING THIS STORY, LATER WRITERS DEVELOPED THE CONCEPT OF “ORIGINAL SIN”

- In Jewish thought, Adam transmitted to posterity a permanent infirmity, the “bad seed” of sin (4th book of Esdras – probably earlier than 220 CE)
- Christian writers (Augustine of Hippo, Anselm of Canterbury, Thomas Aquinas, ...)
 - Death of soul, or “privation of sanctifying grace”, because of sin of Adam
 - Not an act, but a state, a permanent privation, an injury
 - Separation from God, others, & nature
 - Transmitted to all humans by heredity



ORIGINAL SIN IS A STATE OR CONDITION OF “DECADENCE”, NOT A CHOICE

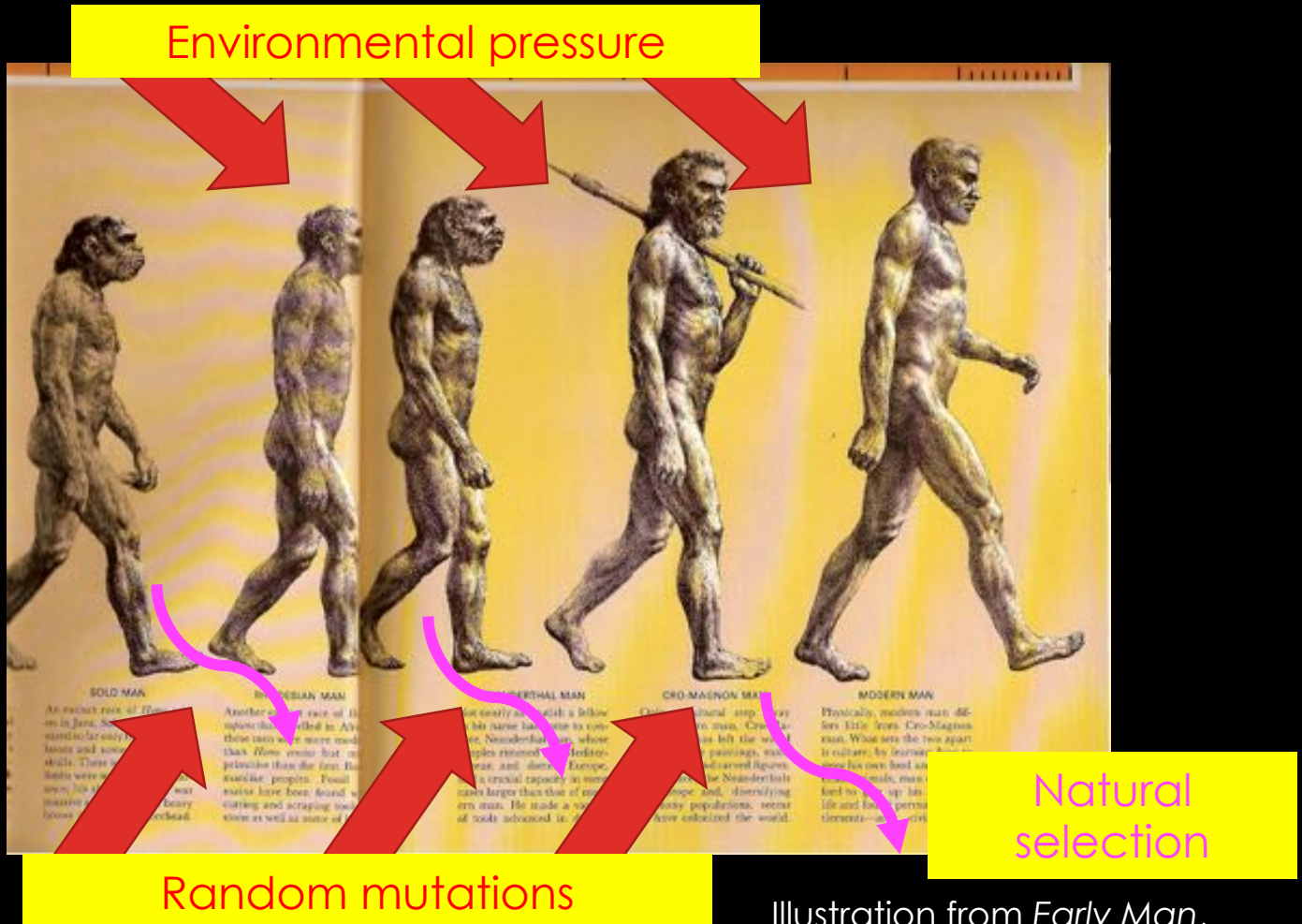
- Some writers have objected to the concept of “Original Sin” as unreasonable:
 - The law of progress opposes the hypothesis of decadence
 - It is unjust that sin of one man causes decadence of whole human race
- “Sin”, itself, is an act and a choice, not a state or condition:
 - A morally bad act, an act not in accord with reason informed by Divine law, known through conscience (Thomas Aquinas, “De malo”, 7:3)
 - In sinning, we take that which is good and turn it into evil
- Original Sin, as a state or condition of “infirmity” or “privation”, resembles a disease or injury, rather than a willful action
 - The Incarnation of Jesus Christ presupposes our collective need to be healed from our diseased state



Christ Healing the Paralytic at Bethesda
Palma il Giovane (Jacopo Negretti), 1592

https://en.wikipedia.org/wiki/Healing_the_paralytic_at_Bethesda

BUT DARWIN'S THEORY OF EVOLUTION (1859) SEEMS TO LEAD TO A VERY DIFFERENT STORY



All species, including humans, arose by a long, gradual, naturalistic process

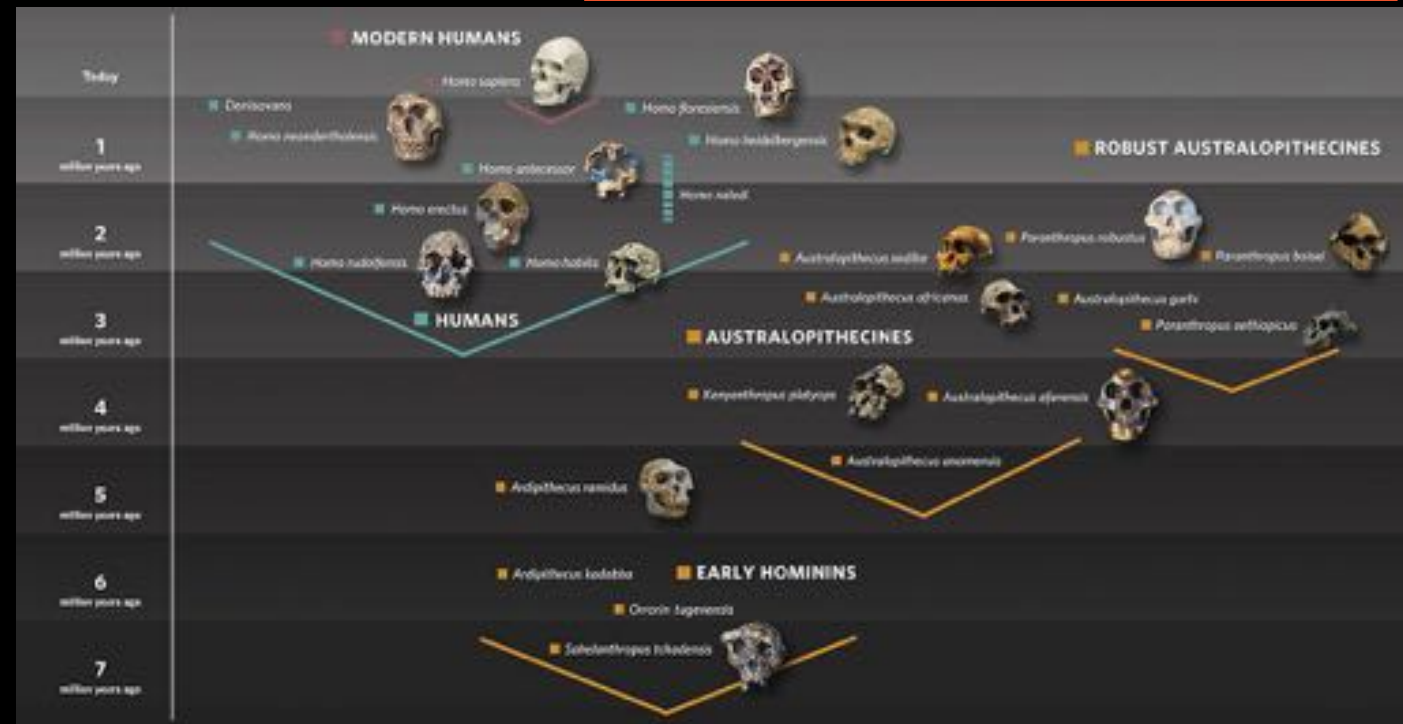
- Random mutations produce biological variation within species
- Environmental pressures favor some variants over others
- Natural selection weeds out unfit variants

Illustration from *Early Man*, ©1965 Time Inc., pp. 44-45

SO IT WAS ALWAYS HARD TO RECONCILE GENESIS 2-3 WITH NEO-DARWINIAN EVOLUTION

<https://www.nhm.ac.uk/discover/the-origin-of-our-species.html>

- If humans evolved gradually from non-human ancestors ...
 - How could there be a “first man and woman”?
 - Even if they did exist, how could their behavior, or “sin”, affect us?
 - In particular, how could its effect be passed down by heredity (i.e., genes)?
 - Isn't “sin” simply the residual effect of our animal nature?
 - Aren't we slowly becoming less animal-like, thanks to natural selection?



MANY CHRISTIANS ACCEPT EVOLUTION ENTHUSIASTICALLY

- Prime example: Jesuit priest, paleontologist, and author Pierre Teilhard de Chardin (1881-1955)
 - Made a total commitment to the evolutionary process as the core of his spirituality
 - Unfolding of the Cosmos and the evolution of matter, to life, to humanity, and ultimately to a reunion with Christ (the “Omega Point”)
- Teilhard objected to the concept of Original Sin
 - Attributing all sin to a single historical act is “grossly immature”
 - Fossils suggest that humans did not emerge from a single pair of ancestors – no Adam and Eve
 - Earthly paradise without death, suffering, and evil was scientifically impossible – no Eden

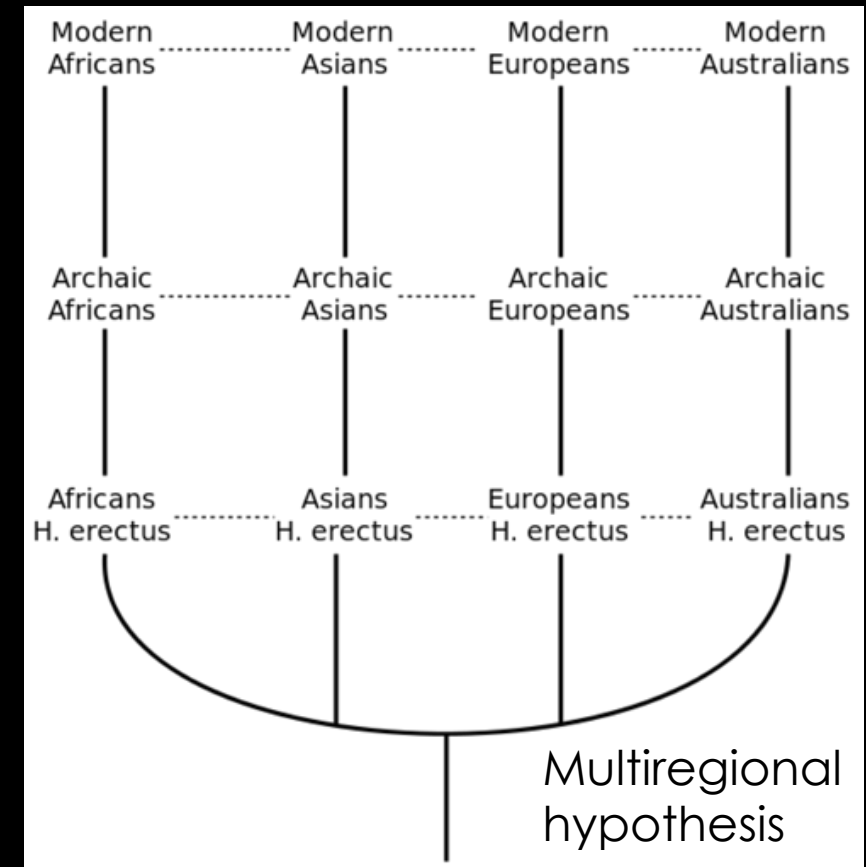


https://en.wikipedia.org/wiki/Pierre_Teilhard_de_Chardin

D. Grumett, <https://www.christiancentury.org/article/critical-essay/pierre-teilhard-de-chardins-theological-trouble>

TEILHARD DE CHARDIN HAS BEEN CRITICIZED FROM SEVERAL ANGLES

- Orthogenesis
 - The idea that evolution has a direction
- Multi-regionalism
 - Teilhard may have adopted common view that humans arose independently in several regions
 - Today, genetic evidence rules this out
- Omission of evil, suffering, and sin
 - Teilhard spends little time on this topic
 - Sin was simply left-over animal behavior that we would shed with time
 - Brief appendix at the end of *Phenomenon of Man* notes a certain inexplicable “excess” of evil, and admits a possible “catastrophe or primordial deviation”



D. Grummett and P. Bentley, "Teilhard de Chardin, Original Sin, and the Six Propositions", *Zygon* 53, 303 (2018)

Pierre Teilhard de Chardin, *The Phenomenon of Man*, (Harper & Row, New York, 1959)

<https://study.com/academy/lesson/multiregional-hypothesis-vs-african-replacement-hypothesis-of-homo-sapiens.html>

SOME CHRISTIANS THINK GOD SHOULD HAVE MADE EVOLUTION GO MUCH FASTER



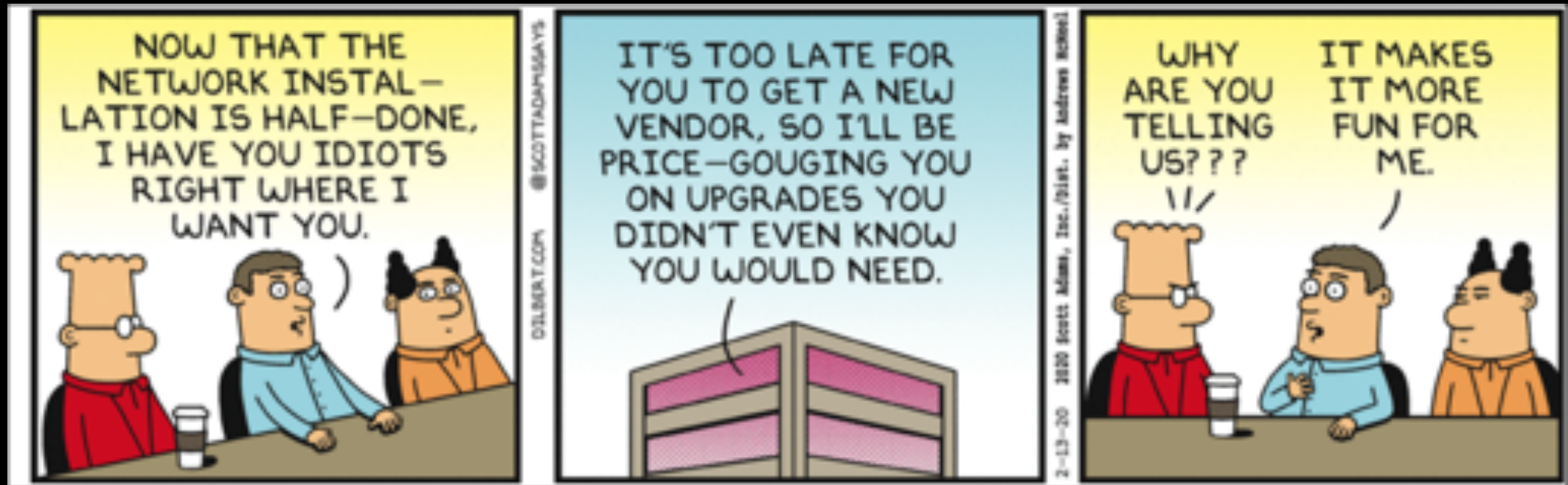
THIS TALK WILL EXAMINE TWO TOPICS NOT TREATED ADEQUATELY BY TEILHARD

- Sin (i.e., harmful behavior) that is uniquely human
 - Harmful behavior *not found in animals* in the natural state
 - If this behavior originated during the transition to behavioral modernity, it would count as “original”
 - *Motivation* for sin will not be examined
 - Status competition
 - Kierkegaard’s definition: in despair, before God, to will to be oneself (“defiance”) or not be oneself (“weakness”)
- “Heredity of sin”
 - Predisposition to uniquely harmful behavior that is *transmitted genetically* and culturally
 - Avenues by which tendency for harmful behavior entered human genome

I’m not promising to re-discover Adam and Eve, or Eden

- But depending on how and where the harmful behavior originated, maybe they are back there somewhere

IT'S NOT FUN FOR ME TO TALK TO YOU ABOUT UNIQUELY HUMAN SIN



...except maybe a little bit

HUMANS AND ANIMALS COMPETE VIOLENTLY FOR SURVIVAL, RESOURCES, STATUS, POWER...



This is *NOT* uniquely human behavior

Publius Horatius Cocles and Two Companions Defend Tiber Bridge, by Augustyn Mirys (mid 1700s, Polish)

...BUT ONLY HUMANS *DEHUMANIZE* AND EVEN *DEMONIZE* OTHER HUMANS



Dachau prisoners liberated by troops of US
42nd Rainbow Division, 29 April 1945

Humans commit genocide

- Nazi persecution of Jews 1933-1945
- Hutu against Tutsi, Rwanda 1994
- ...

Humans enslave other humans

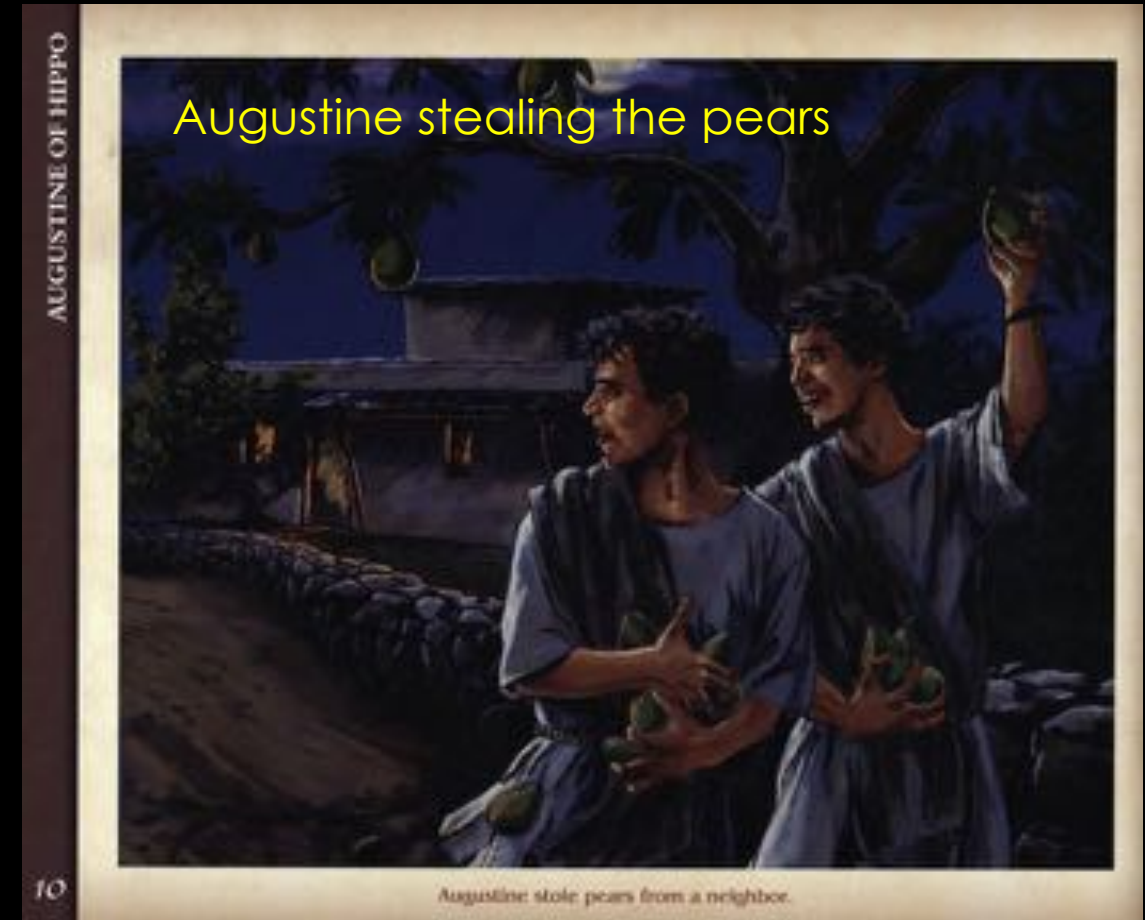
- Neolithic farmers/hunter-gatherers, Europe, ~4000 BCE
- Franks/Roman Gauls, 6th century
- African slave trade 16th-19th cent.
- ...

*Humans attack the value, worth,
meaning, and purpose of other humans*

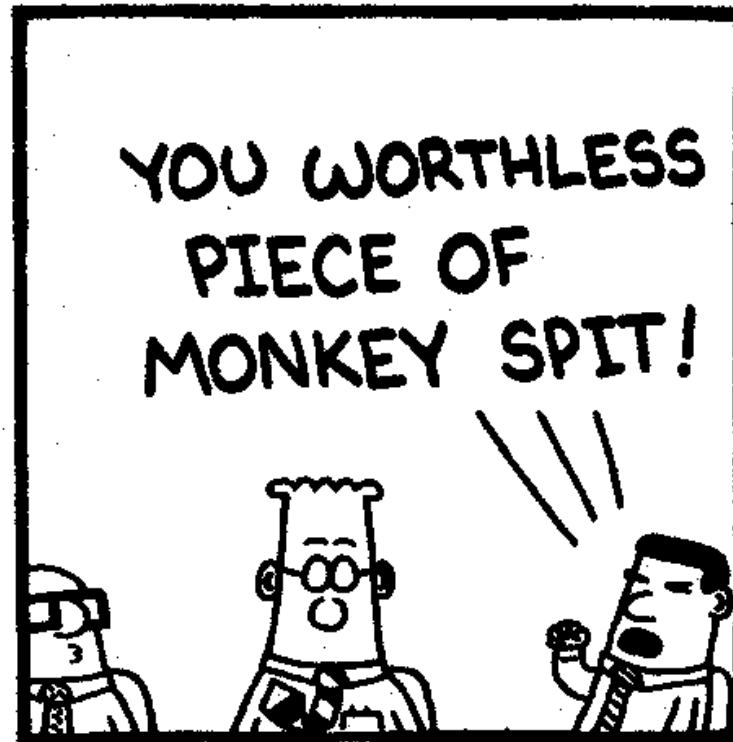
ONLY HUMANS ENJOY WRONG-DOING SIMPLY FOR THE THRILL OF IT

“But it was not the pears that my unhappy soul desired. I had plenty of my own, better than those, and I picked them so that I might steal. For no sooner had I picked them than I threw them away, and tasted nothing in them but my own sin, which I relished and enjoyed.”

Augustine, Confessions, II.6



ONLY HUMANS ELEVATE THEIR MOOD THROUGH ABUSIVE LANGUAGE

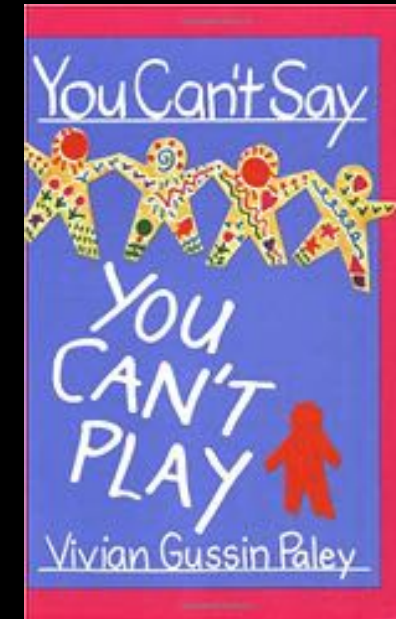


THE LIST OF UNIQUELY HUMAN KINDS OF HARM IS LONG

- Dehumanization and demonization
- Pleasure of wrong-doing for its own sake
- Theory-of-mind cruelty
- Destruction of value, worth, meaning, purpose
- Cursing – imagining an evil future
- Propagation of pain
- Lying, higher order (planned) deception, manipulation
- Premeditated harm (1st degree vs 2nd degree)
- ...

THESE BEHAVIORS SEEM TO BE NATURAL, SINCE THEY START SO EARLY

- Dehumanization and demonization
 - Us and Them
 - “You can’t play with us” – 5- and 6-year olds
- Pleasure of wrong-doing for its own sake
 - Rebellion, “counterfeit liberty”
 - Thrill-seeking personality
- Theory-of-mind cruelty
 - Bullying, teasing, emotional manipulation
- ...



Huge amount of cultural influence is necessary to combat these behaviors

Like language, these behaviors are learned from others, while also depending on a strong innate capability

THESE HARMFUL BEHAVIORS INVOLVE THE CORRUPTION OF GOOD HUMAN TRAITS

- Strong social cooperation, skills, and bonds
- Innovation and risk-taking
- Theory of mind
 - Perspective-taking
 - Empathy
- Language
- Counterfactual reasoning (“If only I had done X, then Y”)
 - Planning
 - Learning
 - Creativity and imagination
- Meaning-making
 - Symbolic behavior
 - Ritual
 - Story-telling
- ...

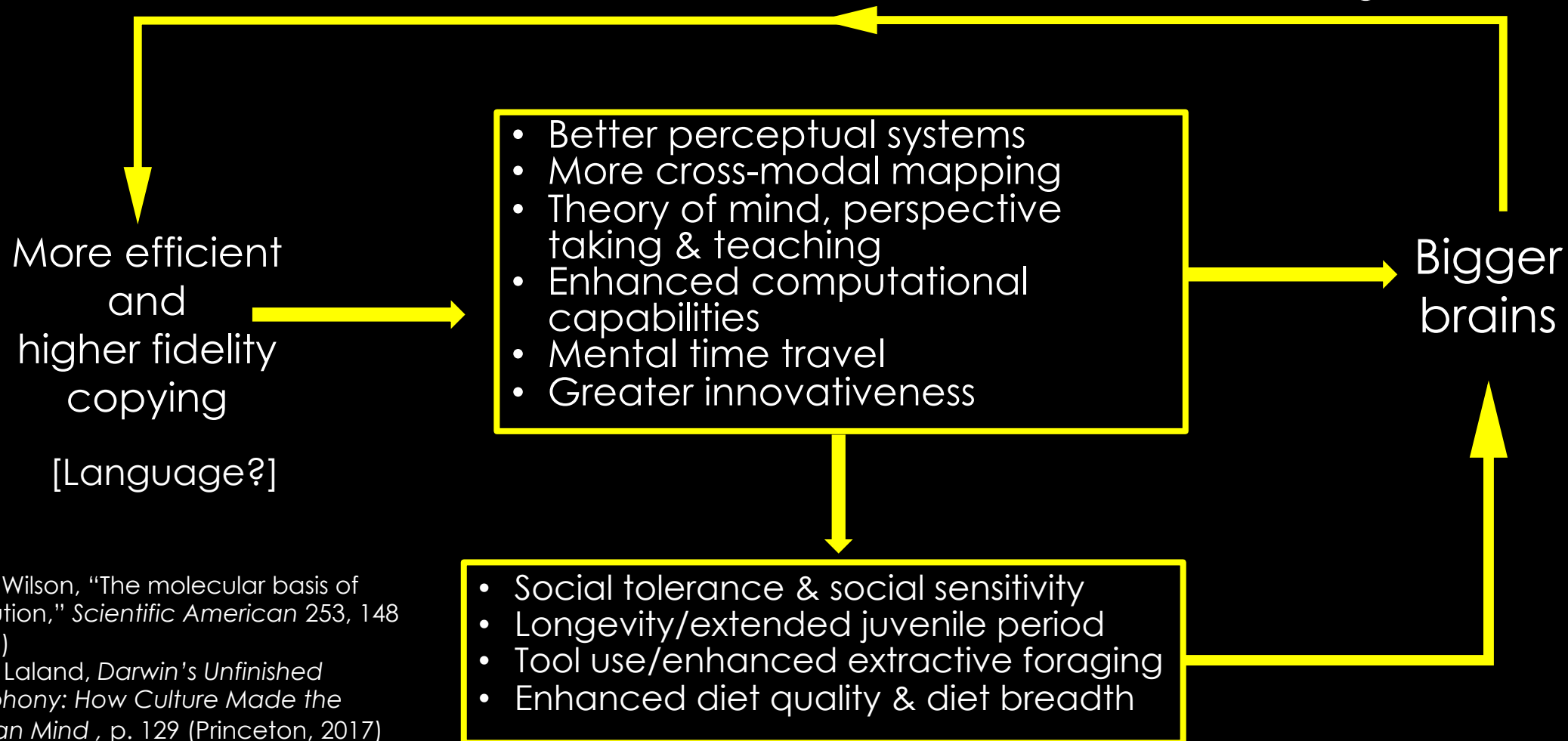
Behavioral modernity

- Suite of behavioral, cognitive traits distinguishing current *Homo sapiens* from other primates
 - Abstract thinking
 - Planning depth
 - Symbolic behavior
 - Music and dance
 - Exploitation of large game
 - Blade technology
 - ...

We refer to these cognitive and behavioral traits of humanity as the “Image of God”

HOW DID BEHAVIORAL MODERNITY EMERGE?

The “cultural drive” hypothesis:
Selection for more efficient and accurate social learning leads to increased brain size, which feeds back to enhance social learning



Allan C. Wilson, “The molecular basis of evolution,” *Scientific American* 253, 148 (1985)

Kevin N. Laland, *Darwin’s Unfinished Symphony: How Culture Made the Human Mind*, p. 129 (Princeton, 2017)

FEEDBACK BETWEEN CULTURE AND BRAIN MIGHT EXPLAIN HOW HOMININ BRAINS GOT SO BIG SO FAST

- Hominin brains began dramatic expansion 2-3 million years ago

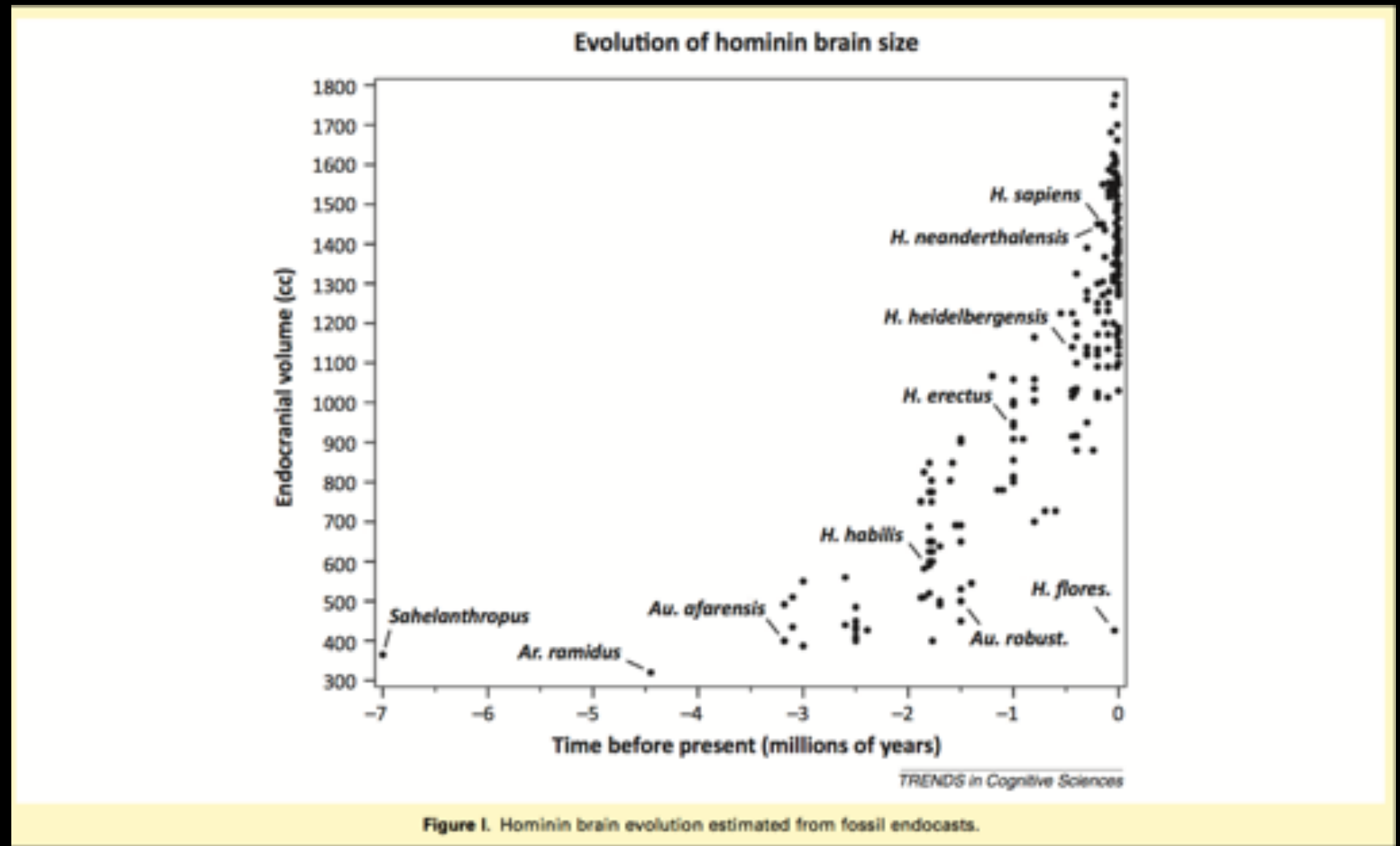
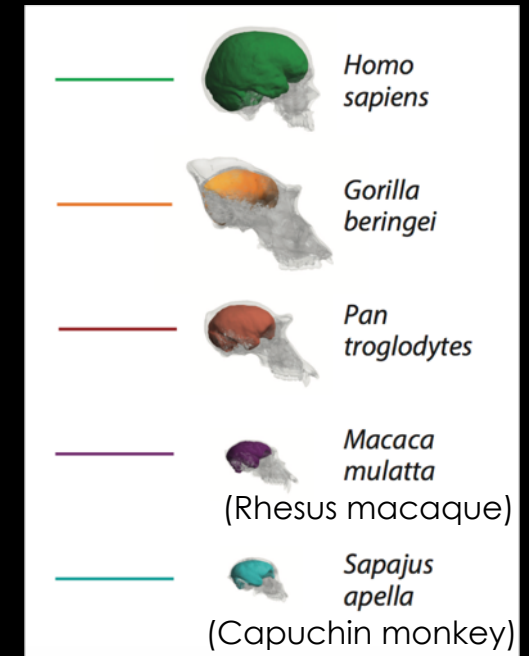
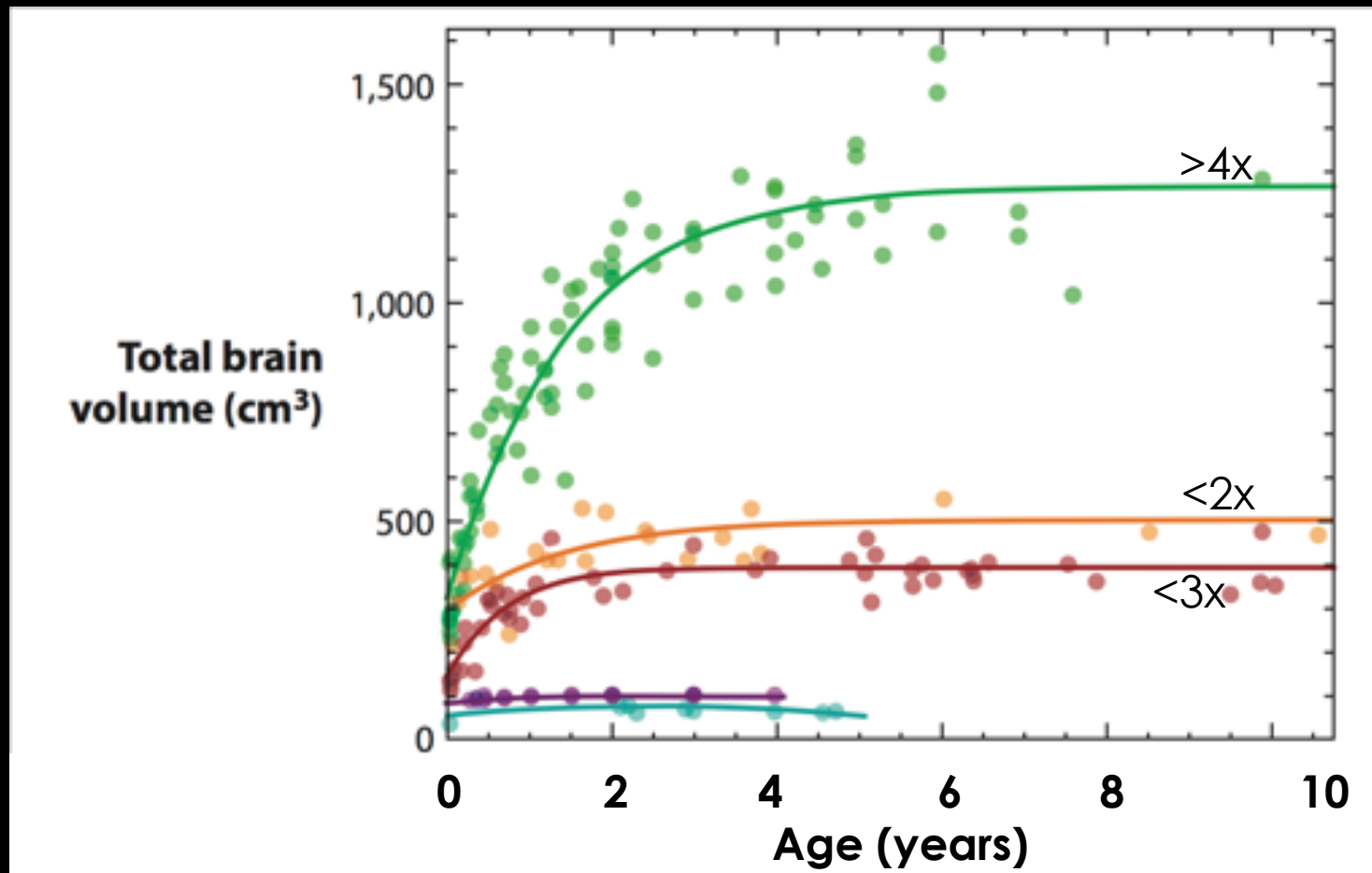


Figure 1. Hominin brain evolution estimated from fossil endocasts.

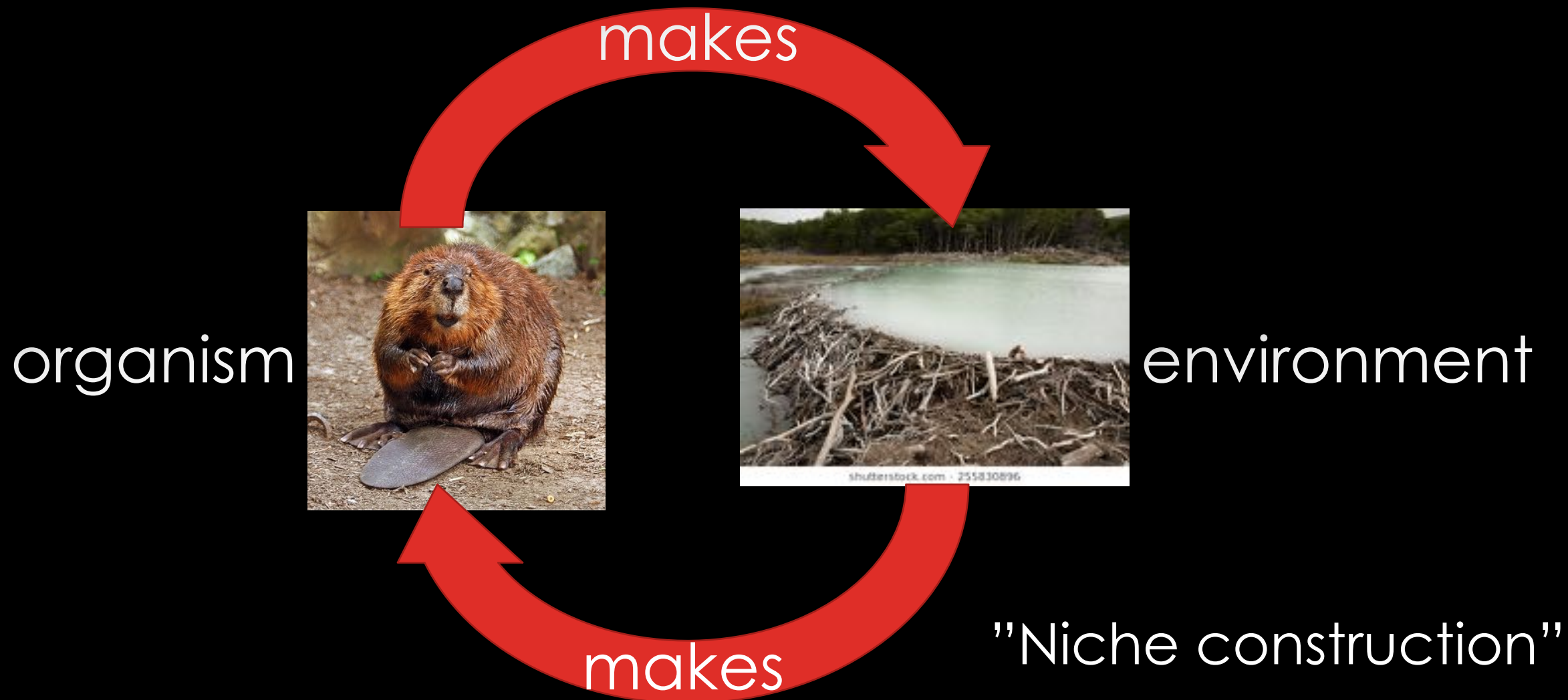
BRAIN VOLUME OF HUMAN BABIES CONTINUES TO INCREASE AT AN EXTREMELY RAPID RATE AFTER BIRTH

- Growth is much faster than in other primates

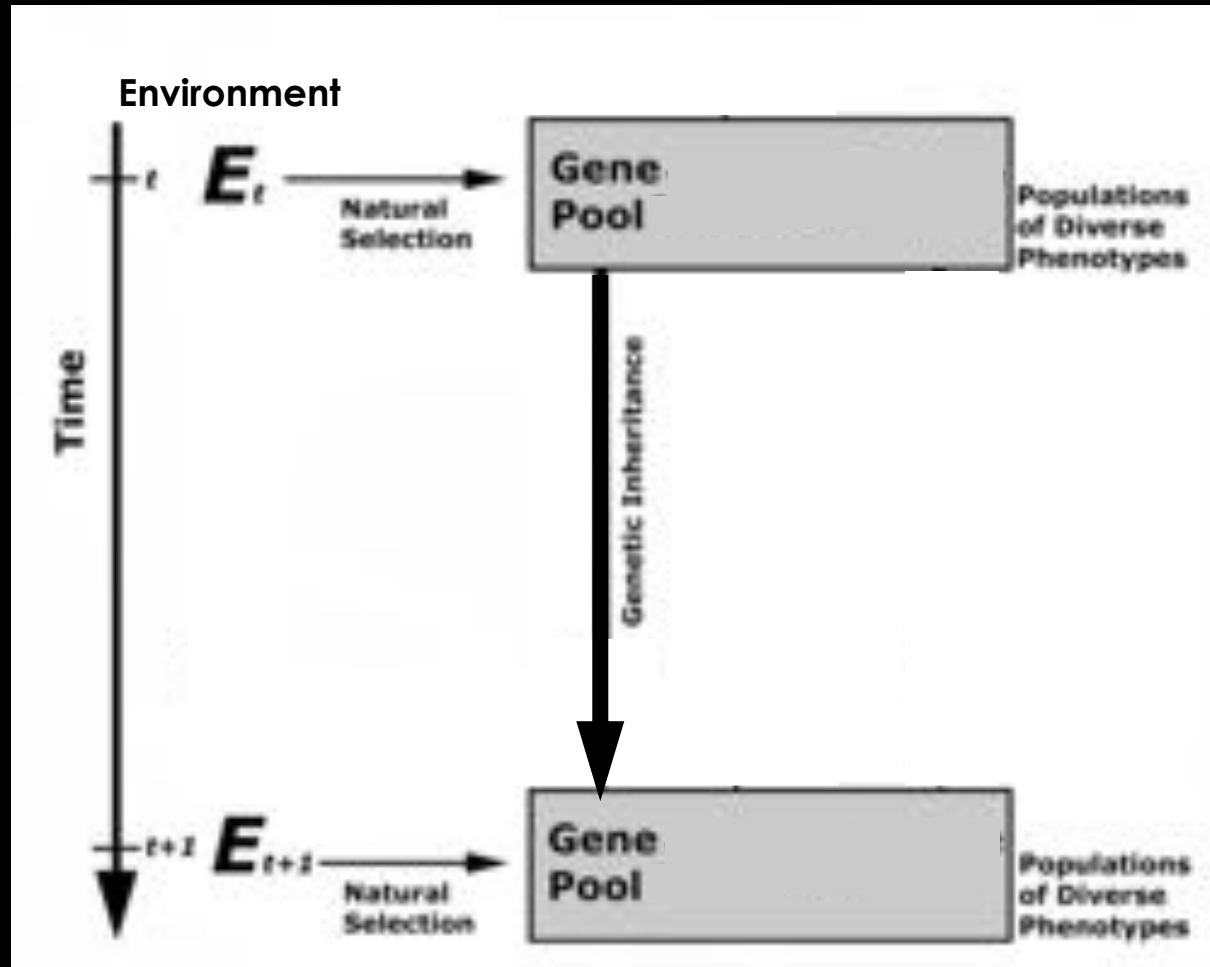


Sherwood and Gomez-Robles,
"Brain plasticity and human
evolution," *Ann. Rev. Anthropol.*
2017, 46:399-419

THERE IS CONTINUAL FEEDBACK BETWEEN ORGANISM AND ENVIRONMENT, OVER GENERATIONS

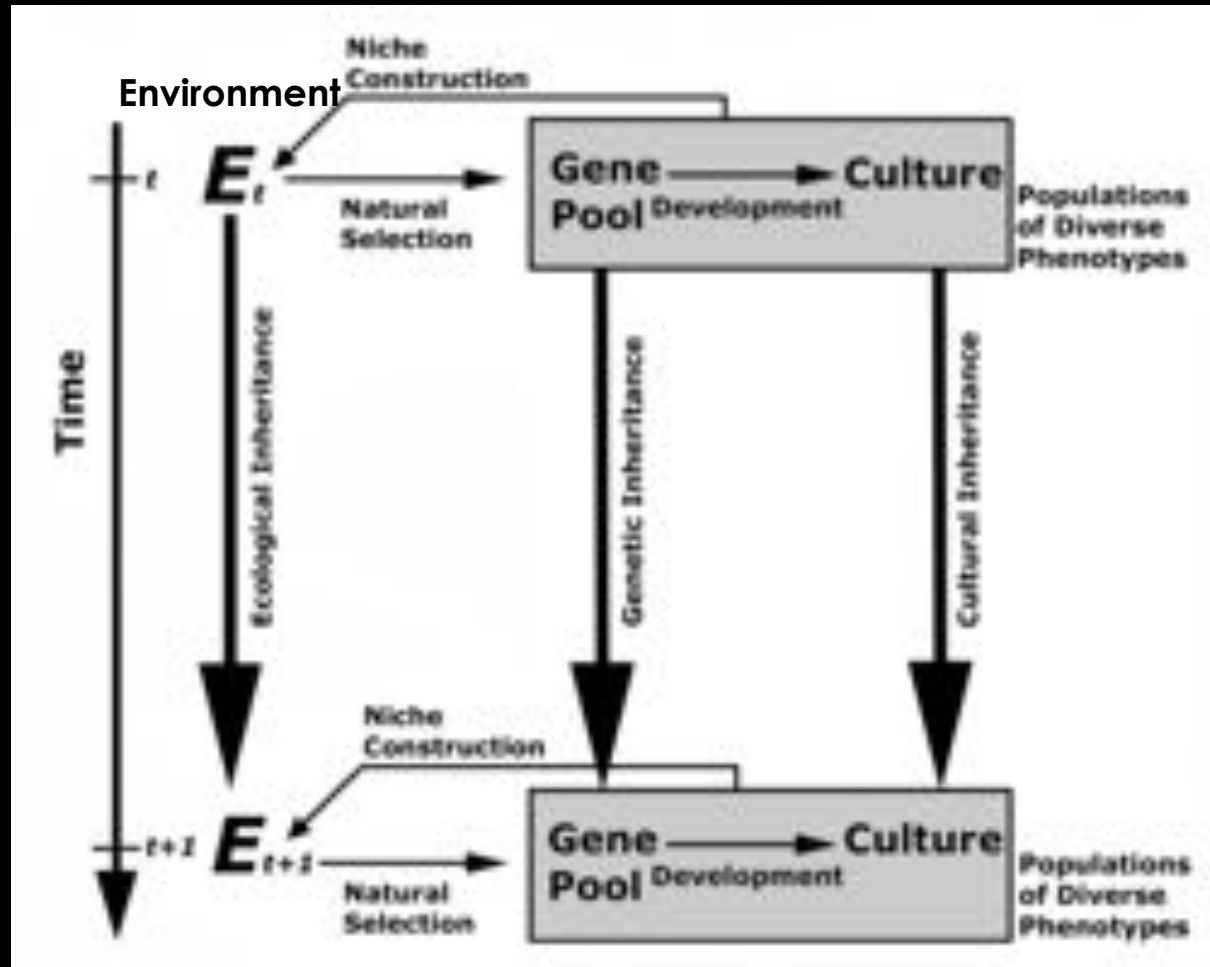


NEO-DARWINIAN PICTURE IS SIMPLE AND MECHANISTIC



- Evolution proceeds by
 - Natural selection
 - Genetic drift
 - Gene flow
 - Recombination
- Gene-centric viewpoint
- Organisms are passive

GENE-CULTURE CO-EVOLUTION RECOGNIZES THAT ORGANISMS PLAY A ROLE



- Organisms
 - Change their environment
 - Learn, change, transmit their culture
- So we have to ask whether organisms have internal states*:
 - Striving
 - Motivation
 - Will, intention, purpose

*Emily R Herrington, "A place for striving and 'agency' in evolutionary theory?", ASA Conference, Golden, CO (2017)

BEHAVIORS HAVE BECOME EMBEDDED IN HUMAN GENES ON MANY OCCASIONS

“Behavior leads, genes follow”

- Use of fire and cooking
 - less time and energy needed for feeding
 - smaller teeth, smaller digestive organs
 - greater caloric intake → permits bigger brains
- Animal domestication
 - milk consumption → lactase persistence in adults
 - Lactose tolerance appeared independently in six separate human dairying population
 - Implies that natural selection *via* human cultural activities may be unusually strong
- Long ocean voyages of early Polynesians
 - severe cold stress and starvation → enhanced energetic efficiency and fat storage
 - present-day predisposition to obesity and diabetes
- Slash-and-burn agriculture of Kwa people in West Africa
 - tree removal → more standing water → more mosquitoes → more malaria
 - more frequent *HbS* genes conferring malaria resistance
 - Neighboring Kwa with different agricultural practices do not show increased *HbS* frequency

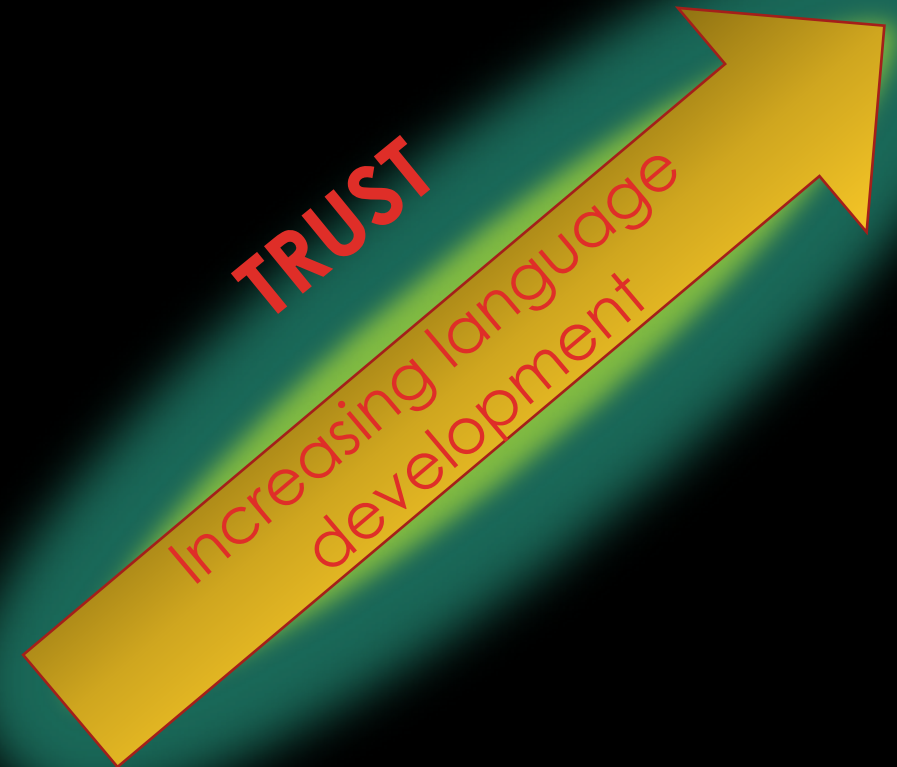


Kevin N. Laland, *Darwin's Unfinished Symphony: How Culture Made the Human Mind*, p. 208-233 (Princeton, 2017)

Mary Jane West-Eberhard, *Developmental Plasticity and Evolution* (Oxford, 2003)

LANGUAGE COULD ARISE ONLY IN AN ENVIRONMENT OF EXTREME TRUST

- It's so easy and useful to lie!
- Primates are often deceptive
 - About food, competition, mating, ...
- Auditory signals must be mostly trustworthy
 - Otherwise they would have been ignored
 - Untrustworthy signaling is selected against
 - Therefore, although chimps and gorillas are smart enough to speak, they do not
- Today, primate auditory signals are *emotional*, thus trustworthy



PERHAPS IT ALL WENT BAD SUDDENLY

- Lying must have arisen suddenly, after language was well developed
- Maybe all the other bad stuff happened along with lying
 - Hard to be trusting, otherwise



Eden



I've said nothing about *mental illness*

- Not a sin
- Uniquely human
- Manipulatable by sinful humans



...in our
DNA

HOW DO WE GET OUT OF THIS PREDICAMENT?

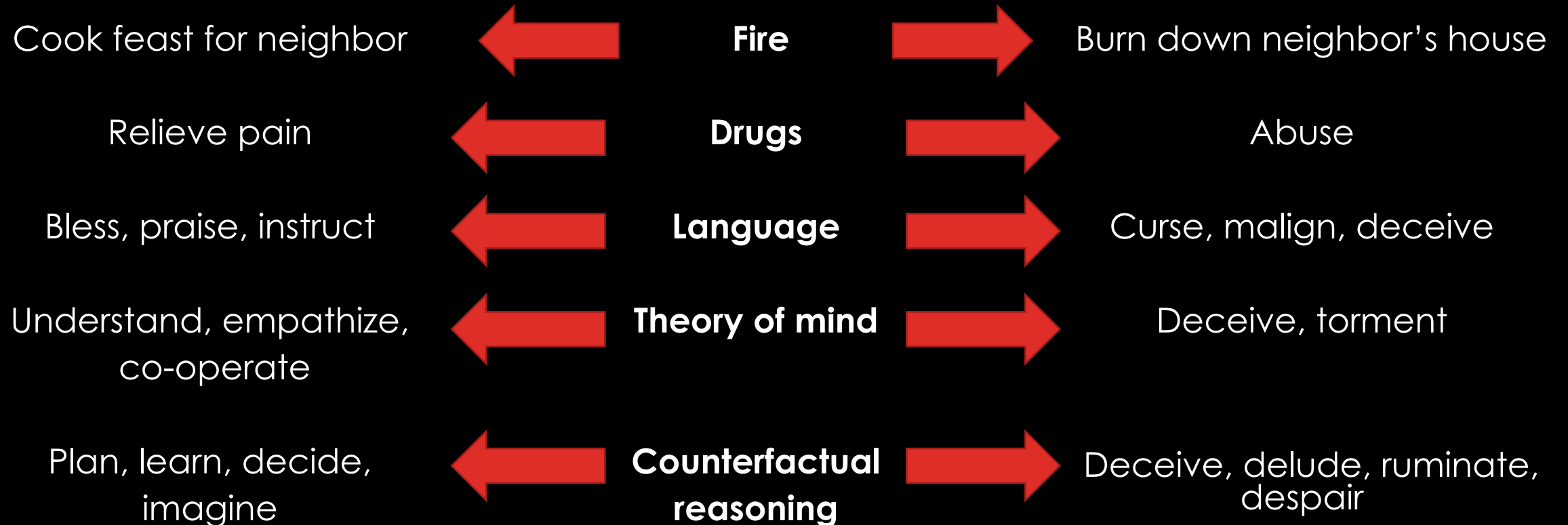
- That's a long story



- Ask us for details!

Backup slides

SIN: THE HUMAN CAPACITY TO TAKE THAT WHICH IS GOOD AND USE IT FOR EVIL



HUMANS REALLY ARE DIFFERENT FROM ANIMALS

- Language
 - Animals communicate using finite repertoire of signals, in the wild
 - Humans generate and understand *infinite* number of utterances, using *finite* number of elements and rules: “generative language”
- Cumulative culture
- Symbol manipulation
- Use of fire
- Alloparenting
 - Human is only animal where, 40 years after birth, offspring can call for mother, who drops everything to attend to offspring

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 - <https://www.dreamstime.com/expulsion-paradise-adam-eve-public-domain-paintings-sacred-history-old-testament-st-petersburg-image102620351>