

COMPARATIVE ANTHROPOGENY: EXPLORING THE HUMAN-APE PARADOX

Glossary

Alloparenting: The investment in young by individuals other than the biological parents. See **cooperative breeding**.

American Sign Language (ASL): A natural language that serves as the predominant sign language of Deaf communities in the United States and most of Anglophone Canada.

Arbitrariness (aka Symbolic Reference): A relationship between a sign and the thing it refers to (its "referent") that is determined purely by mental association rather than by any particular physical parameters (Kluender, 2020).

Art: "A material intervention in relationships between people and the stories that define those relationships" (Davidson, 2020). The expression of imagination, conceptual and symbolic ideas, and skill.

Art Theory (aka Aesthetics): The examination of the subjective qualities of beauty and taste.

Association Cortex (Brain): Extensive territories of gray matter concentrated in the parietal, occipital, and temporal lobes, the territory near the temporal pole, and the forward part of the frontal lobe. Current evidence indicates that expansion of the association cortex was a component of human brain evolution.

Axon (Nerve Fiber): In invertebrates, a long, slender projection of a **neuron** that transmits information (as electrical impulses) to different neurons, muscles, and glands.

Basal Ganglia (Brain): Subcortical nuclei in the base of the forebrains of vertebrates, including humans, which are involved with a variety of functions including control of voluntary motor movements, procedural learning, routine behaviors or "habits" such as teeth grinding, eye movements, cognition, and emotion.

Broca's Area (Brain): A region in the **frontal lobe** of the dominant hemisphere (usually the left) of the human brain with functions linked to speech production.

Central Nervous System (CNS): The majority of the nervous system that consists of the brain, spinal cord, retina, optic nerves, and olfactory epithelium. The CNS integrates sensory information and coordinates and influences the activity of the body in bilaterally symmetric animals (all multicellular animals except sponges and radially symmetric animals such as jellyfish).

Cerebral Cortex (Brain): The outer layer of the cerebrum, composed of folded gray matter, and plays an important role in consciousness.

Cerebrum (Brain): The largest part of the brain that contains the **cerebral cortex**, **hippocampus**, **basal ganglia**, and **olfactory bulb**.

Compositionality: The principle governing the combination of meaningful linguistic elements into higher order units of meaning. Compositionality guarantees that the meaning of the whole will be determined by the meaning of its parts and rules used to combine them (Kluender, 2020).

Cooperative Breeding: A social system in which parents and other individuals within the group provide care for offspring. See **alloparenting**.

Diffusor Tensor Imaging (DTI): Neuroimaging of the location, orientation, and anisotropy of the brain's **white matter** tracts through **MRI**.

Displaced Reference: The ability to refer to entities, properties, and events at some spatial and/or temporal remove from the immediate communicative situation (Kluender, 2020).

DNA: Deoxyribonucleic acid. The molecule of inheritance, which consists of sequences of the four **nucleotide** bases: Adenine, Thymine, Guanine, and Cytosine.

Duality of Patterning: The ability to combine and recombine meaningless linguistic elements (sounds in spoken language, or manual features like handshape, palm orientation, movement, etc. in signed language) into meaningful units (words or signs) (Kluender, 2020).

Eumelanin: The most common type of **melanin** found in human skin and hair. There are two types, brown eumelanin and black eumelanin, which are involved in pigmentation. Deficiency causes albinism.

Foraging: Searching for wild food or provisions as opposed to cultivating food crops or breeding livestock.

Frontal Lobe (Brain): The largest of the four major lobes of the brain in mammals, and is located at the front of each hemisphere. It is devoted to action such as skeletal movement, ocular movement, speech control, the expression of emotions. In humans, the largest part of the frontal cortex is the **prefrontal cortex**.

Functional Magnetic Resonance Imaging (fMRI): A neuroimaging technique for measuring and mapping brain activity that is noninvasive and safe. The phenomenon of nuclear magnetic resonance (NMR) is used to generate a signal that can be mapped and turned into an image of brain activity.

Gene: DNA sequence which encodes a specific function.

Gene-Culture Co-Evolution Theory: A branch of theoretical population genetics that models the transmission of **genes** and cultural traits from one generation to the next, exploring how they interact. Also known as "biocultural evolution" or "biological enculturation" (feedback between culture and biology).

Gene Flow: Movement of **alleles** between populations as is achieved by mating.

Genetic Drift: Change in **allele** frequencies, including fixation and loss, by chance.

Genus: A taxonomic rank used in biological classification of living and fossil organisms to group closely related **species**. In binomial nomenclature, the genus name plus **species** name forms the binomial **species** name (e.g. *Homo sapiens*).

Glia (aka Neuroglia): Non-neuronal cells in the **central nervous system** and the peripheral nervous system that do not produce electrical impulses. Their function is to ensure homeostasis, form myelin, and provide support and protection for neurons.

Grandmother Hypothesis: An explanation of the post-menopausal life stage of human females whereby the existence of grandmothers serves as a biological and social adaptive advantage for humans. Post-reproductive life stages are non-existent among non-human primates, so it is hypothesized that humans evolved to have grandmothers and grandmothering to have individuals who are free to invest their energy into the offspring of their children. This off-loads the reproductive cost of parenting through social kin-networking, and off-set the resource cost of brain-building as parents are freed to provision resources. Increased resource procurement may reduce the inter-birth interval by allowing for earlier weaning, which in turn increases offspring production potential, passes down generational knowledge, and increase social networks. In doing so, the grandmother ensures the survival of her genes in subsequent generations. The extended post-reproduction lifestage of grandmothers likely had the added output of producing grandfathers, who also provide benefits to the extended family, as well as their own extended reproductive timeline that competes with subsequent generations.

Gray Matter (Brain): A major component of the central nervous system that includes regions of the brain involved in muscle control, sensory perception such as seeing and hearing, memory, emotions, speech, decision making, and self-control. Grey matter development peaks the third decade in humans.

Great Apes: A taxonomic family denoting the extant chimpanzees, bonobos, gorillas and orangutans.

Gyrus (Brain): A ridge on the **cerebral cortex** that, along with surrounding **sulci** (furrows) creates the folded appearance of the brain in humans and other mammals.

Hadza (Hadzabe): An indigenous ethnic group of traditionally nomadic hunter-gatherers from the central Rift Valley and Serengeti Plateau of Tanzania. Tourism, encroachment by pastoralists, and land rights disputes critically threaten their way of life.

Hippocampus (Brain): A part of the limbic system that plays important roles in the consolidation of information from short-term memory to long-term memory, and in spatial memory that enables navigation. A major component of the brain of humans and other vertebrates. Humans and other mammals have two hippocampi, one in each side of the brain. It is named after its resemblance to the shape of a sea horse.

Hominin: A classification of species comprising humans and our extinct relatives following the split with the common ancestor with chimpanzees.

Human Accelerated Regions (HARs): A set of 49 segments of the human genome that are conserved throughout vertebrate evolution but are strikingly different in humans. They are named according to their degree of difference between humans and chimpanzees. Some of these highly mutated areas may contribute to human-specific traits while others

may represent "loss of function" mutations, possibly due to the action of biased **gene** conversion rather than adaptive evolution.

Hunter-Gatherer: A human living in a society in which most or all food is obtained by foraging (collecting wild plants and pursuing wild animals), in contrast to agricultural societies, which rely mainly on domesticated species.

Hybridization: Breeding among recognized **species**.

Icon: A sign that shares perceived physical properties with the thing it refers to (its "referent") (Kluender, 2020).

Index: A sign that depends for its reference on the physical presence of the thing that it refers (its "referent") to at some point in space and time (e.g. smoke, a weather vane, a bullet hole, your index finger) (Kluender, 2020).

Inferior Frontal Gyrus (Brain): The lowest positioned **gyrus** of the frontal gyri, of the **frontal lobe**, and is part of the **prefrontal cortex**. It is located in **Broca's area**, which is involved in language processing and speech production.

Inferior Temporal Cortex (Brain): The **cerebral cortex** on the inferior convexity of the temporal lobe in primates, including humans and is it is crucial for visual object recognition.

Inter-birth-interval: The space between births.

Introgression: Transfer of **alleles** between **species**.

Language (Human): A structured system of communication that is generative (combine words/symbols to convey an infinite number of ideas), recursive (builds upon itself without limit), and has **displaced reference** (describe things not present).

Life History: The schedule of life, including birth to sexual maturity, duration of the reproductive period, duration of the post-reproductive period (if there is one), and mortality rate at each stage.

Limbic System (Brain): Structures of the brain that deal with emotions and memory.

Longevity: Typical length of life.

Mating Effort: The sex with the higher potential rate of reproduction invests more in mating effort than in parental effort. Greater mating effort is associated with faster life history strategy.

Melanin: For most organisms, it is the pigment in skin and hair, but is also found in the iris of the eye, the inner ear, and some parts of the brain. Melanin is produced as three basic types: **eumelanin**, **pheomelanin**, and **neuromelanin**. The melanin in the skin is produced by melanocytes, which exist across human populations in similar concentration in their skin. However, the melanocytes in some populations produce variable amounts of melanin. This variation is likely due to the melanin's property to absorb and dissipate UV radiation, protecting skin from harmful damage. UV exposure is associated with increased risk of malignant melanoma, a cancer of melanocytes.

Microbiome: The totality of all organisms (microbes) that live

on and in the body.

Morphology (Biology): Shape or form (outward appearance) of an organism. The branch of biology interested in the form and structure of organisms and their specific structural features.

Music: An auditory form of art composed of pitch (melody and harmony), rhythm (tempo, meter, articulation), dynamics (loudness/softness), timbre and texture.

Musicality (in humans): A natural, spontaneously developing sensitivity to, knowledge of, or talent for music based on and constrained by our biological and cognitive system, which is then culturally informed and reinforced.

Myelin Sheaths: Sleeves of fatty tissue (wrapped cell membrane) that protect nerve cells.

Neuron: A specialized cell that transmits nerve impulses.

Non-Invasive Neuroimaging: The use of various techniques, such as **Functional Magnetic Resonance Imaging**, to image the structure, function, or pharmacology of the nervous system.

Olfactory Bulb (Brain): A neural structure of the vertebrate forebrain involved in sense of smell.

Oligodendrocytes (Brain): A type of **neuroglia** that supports and insulates **axons** in the **central nervous system** of some vertebrates.

Ontogeny: The origin and development of an organism (from fertilization of the egg to the organism's mature form). Can also refer to the study of an organism's lifespan.

Parental Effort: The sex with the lower rate of reproduction invests more in parental effort than in mating effort.

Parental Investment: The investment of resources (time, energy, provisions) into offspring.

Parental Investment Theory: The correlation between **parental investment** and mate choice where the greater the parental investment the more selective, and the lesser the investment the greater the access to more mates (Trivers, 1972).

Parietal Lobe (Brain): One of the major lobes in the human brain, roughly located at the upper back in the skull ("crown"). It processes sensory information such as touch, taste, and temperature, spatial senses and navigation (proprioception), and language processing.

Prefrontal Cortex (Brain): The **cerebral cortex** that covers the front part of the **frontal lobe** and is linked to complex cognitive behavior, personality, long and short-term memory, decision making, speech, language, and a person's will to live.

Phenotype: Observable traits of an organism that result from interactions between genes and environment during development.

Postmenopausal Longevity: The period of time after a woman has ceased ovulating. This life-stage is unique to humans and not expressed in non-human primates.

Posterior Parietal Cortex (Brain): The portion of **parietal neocortex** that plays an important role in planned movements, spatial reasoning, and attention.

Productivity: The open-ended ability to combine meaningful linguistic units into new higher order units of meaning: for example, roots, prefixes (e.g. anti-), and suffixes (e.g. -ish) into words, and words (or signs) into phrases and sentences (Kluender, 2020).

Savanna: An ecosystem featuring hot, seasonally dry conditions, and vegetation consisting of open-canopy woodland and grassland.

Serious Play: A form of play that uses inquiry and innovation for complex problem-solving.

Species: A biological population whose individuals can mate with one another to produce viable and fertile offspring. This is a debated definition and the concept is problematic for extinct fossil organisms for which **DNA** is not available.

Storytelling: The social and cultural activity of sharing stories for entertainment, education, or instilling morals and values.

Sulcus (Brain): A depression or groove in the **cerebral cortex** that, along with a **gyrus** (ridge), creates the folded appearance of the brain in humans and other mammals. The larger sulci are usually called fissures.

Symbol: A sign that has an arbitrary and non-physical relationship with the thing that it refers to (its "referent") (Kluender, 2020).

Symbolic Play: A type of play involving fantasy, imagination, and pretend to us available objects as stand ins for other objects.

Schizophrenia: A mental disorder characterized by delusions, hallucinations, disorganized speech and behavior, and other symptoms that cause social or occupational dysfunction (DSM-V, 2013).

Temporal Lobe (Brain): One of the four major lobes of the **cerebral cortex** in the brain of mammals. The temporal lobe is located beneath the lateral fissure on both cerebral hemispheres of the mammalian brain.

Theory of Mind (ToM): The ability to attribute mental beliefs, desires, intentions, and perspectives, etc., to oneself and to others, and to understand that others have beliefs, desires, intentions, and perspectives that are similar or different from one's own. Related/Overlapping Terms: "Intentionality," "Attribution of Mental States," "Inter-subjectivity," "Mind-Reading," "Perspective taking," "Other-regarding Impulses," etc.

White Matter (Brain): Areas of the central nervous system that affects learning and brain functions, modulating the distribution of action potentials, and acting as a relay and coordinating communication between different brain regions. White matter development peaks in middle age in humans.