

"THE PAEHLISURIC ROOTS OF A HUMAN CONCEPT OF SYMMETRY"

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The development of a human concept of symmetry is traced from the earliest bipedal hominids through the evolutionary progression to anatomically modern humans Homo sapiens sapiens. Examination of the material culture of wild and (especially) captive chimpanzees suggests a very primeval concept of balance and symmetry, and suggests that the biological foundation for this cognitive trait is quite ancient; it is believed that humans and common chimpanzees had a common ancestor between five and ten million years ago, and that modern chimpanzees may exhibit more of the primitive ancestral cognitive characteristics.

Evidence from the earliest stone age (the Oldowan) shows that hominids between 2.5 and 1.5 million years ago, including Homo habilis and Homo erectus had mastered the basic principles of flaking stone by percussion, including the intuitive geometric understanding that an acute (less than ninety degree) angle was required to strike off flakes with a stone hammer. Although many of the "core tool" forms (e.g. choppers, discoids, polyhedrons, core scrapers) can be arrived at during flake production, with little or no attention to core form, there may be a rudimentary concept of bilateral symmetry in some of these core forms as well as in retouched flake elements (flake scrapers, awls.) The most symmetrical form occasionally found in the Oldowan, the spheroid (an almost perfectly

spherical battered stone) is probably not the result of intentional fabrication but rather a by-product of its long-term use as a hammerstone.

Between 2.0 and 1.5 million years ago there is also evidence of preferential right-handedness in early hominid tool-making populations, based upon analysis of flaked stone material. This evidence, combined with palaeoneurological evidence from endocasts of fossil hominid skulls, suggests that reorganization of the hominid brain by this time that may imply a stronger lateralization of the left and right hemisphere than is presently observed among non-human primates.

The circular stone structure in Bed I of Olduvai Gorge, Tanzania, approximately 1.8 million years old, appears to be a compositional feature constructed by early hominids; this precocious feature has no similar archaeological analog for the next 1.5 million years.

At approximately 1.5 million years ago, the same time of the emergence of Homo erectus in the fossil record of Africa, there is a technological shift towards the production of large artifact forms, often made on large flakes struck from boulder cores, called picks, handaxes, and cleavers. These forms are the hallmark of the Acheulean industrial stage, which lasts for over a million years in Africa and spreads to Eurasia (along with the first hominids to populate Eurasia) about one million years ago.

These Acheulean forms, ranging from 1.5 million years ago down to approximately 200,000 years ago, show some development in sophistication and craftsmanship through time (although stylistic norms are highly variable.) There is a strong sense of bilateral symmetry even in the earliest forms, which becomes more defined in later Acheulean occurrences, especially between 500,000 and 200,000 years ago, the time of evolutionary

transition from Homo erectus into archaic forms of Homo sapiens.

Other possible signs of a concept of symmetry in this period include engraved bones with simple geometric designs, exhibiting a conception of parallelism and equidistant spacing.

Beginning approximately 200,000 years ago there is a technological shift towards flake tools, often struck from prepared core forms, which is called the Middle Palaeolithic in Europe, the Middle East, and North Africa, and the Middle Stone Age in Sub-Saharan Africa and East Asia. These technologies exist in some places less than 35,000 years ago. This is the time period of forms of Archaic Homo sapiens, including the Neanderthals (Homo sapiens neanderthalensis) of Eurasia, and also marks the emergence of anatomically modern humans (Homo sapiens sapiens), perhaps 100,000 years ago or more, in Africa.

Bilateral symmetry can be seen in many of the stone artifacts produced during this time period, including unifacial and bifacial points, later handaxe forms, prepared cores and flakes, lanceolates (in Africa), and tanged elements (North Africa.) In Eastern Europe the first examples of bone projectile points are also found.

Other signs of a symbolic sense include an polished plaque and engraved pebble from Tata, Hungary, as well as engraved bones from La Ferrassie in France and Bacho Kiro in Bulgaria.

Compositional features of symmetry in this technological stage include the Neanderthal "cemetery" at the French rockshelter of La Ferrassie, in which a series of earthen mounds were organized in a geometric pattern, and the palaeolithic structure of Moldova in the Ukraine.

The Later Palaeolithic (called the Upper Palaeolithic in Europe) is

associated with Homo sapiens sapiens or anatomically modern humans. It is assumed that these individuals possessed the same basic brain structure, cognitive and symbolic abilities, and linguistic capacities that characterize extant humans today. The earliest representational art, in the form of paintings, engravings, and sculpture, as well as an abundance of "abstract" (geometric) designs are common during this period, especially in certain geographical regions.

Bilateral symmetry is especially evident in the Gravettian "Venus" figurines of Western and Eastern Europe, carved zoomorphs throughout this period (and especially in the Magdalenian phase) stone, bone, and antler tools, and the stone, bone, and ivory foundations of hut structures.

This paper stresses the fact that the artifactual manifestations of symmetry became more numerous, defined, complex, organized, and stylized through time. This may be correlated with the evolution of the human brain over the past three to four million years, with an ever-increasing pattern of symbolism in the form of imagery, thought, and communication.

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