the Mid-Eocene suggests poor low- but good high-frequency hearing. Those from the earliest Oligocene and Early Miocene exhibit morphology suggesting hearing sensitivity similar to modern anthropoids, with relatively good high- and low-frequency hearing. These findings suggest that primates went through a poor low-frequency phase during the development of modern hearing patterns. By combining these results with data on ambient acoustics and vocalization frequencies in extant primate communities, we argue that early primates were likely limited to using high-frequency, short-range calls.

White-faced saki (*Pithecia pithecia*) vocalizations in relation to ambient noise at Brownsburg Natuurpark in Suriname.

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The bulk of primate vocalization research in relation to the environment has focused on long call adaptations; however, maximizing the transmittable distance for all calls would be detrimental to an individual. This would be both energetically costly and increase predator detection. It is likely that some primates have evolved vocalizations that camouflage short distance calls within ambient noise to reduce eavesdropping by predators. However, signals requiring transmission over long distances should contain frequencies outside of ambient noise to increase detection by potential receivers. Research was conducted on two groups of *P. pithecia* at Brownsburg Natuurpark Park in Suriname. Data collection included all occurrence digital recordings of vocalizations, as well as group spread at the time each call was produced. Short distance calls were classified as most commonly occurring during normal intragroup behavior, where all individuals were within short distance detection (<30 meters). Long distance calls were classified as occurring when group spread was greater than 30 meters or in the context of inter-group encounters. Peak frequencies of 475 recordings were analyzed for both the call and of ambient noise 0.1 seconds prior to the call. Our results show *P. pithecia* have adapted signaling behavior that maximizes the detection of long calls by avoiding ambient noise frequencies while minimizing predation risk by masking short distance calls within ambient noise. These findings are important in future study of complex vocal and social relationships, and how animals may alter their signals in order to conform to the constraints of the environment.

Automatic, landmark-free quantification of 3D endocranial asymmetries in extant and fossil species: new insights into paleoneurology.

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The study of endocranial asymmetries of hominids is a central topic in paleoneurology. However, our knowledge about the emergence of these asymmetries during human evolution is still limited. This is partly due to the fact that, so far, these 3D asymmetries have been mostly analyzed using landmarks-based methods. Such methods are limited as they only provide a partial description of the anatomy and thus of the possible asymmetries. The endocranial anatomy may be better described by its whole contour, and the recent advent of computational tools allowing to process 3D free-form surfaces opens new tracks for automated and objective characterization of 3D endocranial asymmetries. One key problem before assessing the evolution of patterns of asymmetry in hominids is the identification of confounding factors such as age, sex and intra-specific variability. For this purpose, we use a new method for the automated quantification of 3D virtual endocranial shape of 60 *Pan paniscus* and 59 *Pan troglodytes* of different dental age and sex. 3D statistical analyzes are led to assess significantly asymmetrical areas on the endocasts within each population, and a comparison is made between the two populations. Several fossil hominin endocasts (such as Australopithecine species and fossil *Homo* species) are then reexamined in light of the previously estimated variability with these two extant Pan species. These new computational tools may offer a new way to address the question of how the typical endocranial asymmetries within modern humans (*e.g.* protrusions of the frontal and occipital lobes) emerged during evolution.

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The first complete fourth metatarsal of *Australopithecus afarensis* from Hadar, Ethiopia.

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The first known complete fourth metatarsal (AL 330-160) of *Australopithecus afarensis* was recovered in 2000 from Hadar, Ethiopia. This 3.2 myr-old fossil provides the opportunity to investigate whether the foot of *A. afarensis* had well developed pedal arches and was characterized by metatarsophalangeal dorsiflexion, attributes unique to humans among hominoids. AL 333-160 was compared to a sample of N=10 each *Homo sapiens*, *Pan troglodytes* and *Gorilla gorilla* MT4s. Novel non-landmark-based morphometrics using 3D laser-scan data with Polyworks software were used to quantify and compare articular surface orientation and distribution, as well as its linear and angular geometry. Normals to articular surfaces were fit, and surface curvatures compared using deviations from spheres and planes. Results indicate that this specimen had roughly 17° of torsion, comparable to that of humans and Dmanisi *Homo erectus*, clearly indicating the presence of a transverse arch. The proximal end of the bone is dorsoplantarly elongated, with an expanded ligamentous attachment area near the base, and is less dorsoplantarly concave than in extant apes, thus resembling the MT4 of other hominins including *Ardipithecus ramidus*. As in other hominins, the plantar surface of the distal articular surface faces more distally than in apes. AL 333-160 also exhibits the dorsal doming of the head, reflecting habitual loading of the metatarsophalangeal joint in dorsiflexed postures that accompany toe-off during the human striding gait. This metatarsal shows that in its possession of both longitudinal and transverse arches the *A. afarensis* foot was fundamentally similar to that of modern humans.

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