From bones to plausible (loco)motion: Palaeoanthropological point of view

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Recent discoveries of early hominins (dated up to 7 My) highlight an unexpected diversity of locomotor anatomies that lead palaeoanthropologists to hypothesize that bipedal locomotion took distinct shapes through our phylogenetic history. A much more complex scenario of hominin evolution than those proposed only few years ago is thus emerging, where knowledge on locomotor anatomy takes an increasing role. Given the fragmented nature of fossil specimens, the main challenge for palaeoanthropologists remains estimating the potential locomotor impacts of morphological differences – often very subtle compared to those between living habitual (humans) and occasional bipeds (apes) – in order to improve our knowledge on the manner hominines walked. In this talk, we first review the main approaches based on functional anatomy principles that palaeoanthropologists develop in that aim. We then introduce the multidisciplinary study we are developing toward a more specimen-specific approach of the fossils. At this stage, this approach integrates comparative anatomy and biomechanical knowledge as well as tools of motion modelling and simulation. As first results we show that it allows simulating plausible gaits for living primates (here human and chimpanzee) and fossil hominin species (here *Australopithecus afarensis*) based on a set of individual anatomical data.