

3D approaches in paleoanthropology: small steps beyond William White Howells

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WW Howells, among the first physical anthropologists to recognize the potential of multivariate analysis for skeletal population morphology, took advantage of the computers and programs available from the 1950s onwards to interpret mainly craniometric data using factor and discriminant analyses. He brought these approaches into his classrooms where students were led to consider them as the norm rather than exceptional. Building on this early exposure, Delson and in turn his students have been privileged to work with a variety of colleagues on projects which moved beyond multivariate analysis of linear interlandmark distances to 3D landmark analyses (which, unlike distances alone, retain the geometric relationships among the landmarks). Such geometric morphometric (GM) studies have often involved physical anthropology, in no small part because Bill Howells set the stage. The NYCEP Morphometrics Group (<http://www.nycep.org/nmg>) is working on two major projects. The first is a study of tibiotalar joint congruence using LANDMARK EDITOR to place semilandmark grids on laser scans of joint surfaces, which are then analyzed using GM. With this approach we can differentiate human, gorilla and chimpanzee bones and approach a separation of elements from single individuals. The second uses GM to visualize evolutionary transformation in fossil papionins. It combines landmark data with laser surface scans to build "averaged" surface models of crania from taxa whose relationships are fixed by a dated molecular phylogeny. We can then calculate the morphology of hypothetical intermediates ("ancestors") along the tree and compare them to known fossils and other inferred morphotypes.

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