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**3D landmark and semilandmark  
geometric morphometric analysis  
of the Zuttiyeh fronto-zygomatic  
fragment.**

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The relationships of Zuttiyeh I (dated ca. 300-200 Ka) have been debated since its discovery in 1925. It has been variously assigned to *H. erectus*, early Neanderthals, and

early *H. sapiens*. Its geographic position in the Levantine Corridor in combination with its probable Middle Pleistocene date make it a crucial specimen in later human evolution; however, because of its fragmentary condition, the Zuttiyeh fossil is rarely included in morphometric studies.

To better quantify features of this specimen, we used cutting-edge 3D semilandmark geometric morphometric techniques. Seventy-seven landmarks and semilandmarks (curves and surface patches) were located on fifteen scans of Pleistocene fossil crania representing early *H. sapiens* (N = 2), *H. neanderthalensis* (N = 5) and *H. heidelbergensis s.l.* (N = 8) and sixty-three scans of recent human crania from the AMNH. The semilandmarks were re-sampled to yield equidistantly spaced landmarks for each individual and were slid along curves to minimize the bending energy of the thin-plate spline. 3D-coordinates of these (semi)landmarks were converted to shape-coordinates using Procrustes superimposition. Two additional analyses of the specimen were undertaken using landmark (collected by KH) and curve (collected by IJ) data, respectively, so as to independently assess the robustness of the analysis. Data were analyzed using Principal Component Analysis, inter-individual Procrustes Distances, cluster and discriminant analysis. Preliminary results show that the Zuttiyeh specimen is intermediate between all archaic specimens and modern humans, though it classifies as *H. heidelbergensis s.l.* in a Discriminant Function Analysis. Implications of these findings for modern human evolution are discussed.

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