

**MA Thesis – Human Skeletal Biology Track, Physical Anthropology - New York  
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**ANALYSIS OF CONGRUENCE AND ASYMMETRY OF THE ATLANTO-OCCIPITAL JOINT**

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**Abstract**

Osteometric sorting techniques, including the analysis of joint surfaces, are commonly used in the process of reassociating isolated skeletal elements in forensic cases. The atlanto-occipital joint has been classified as a joint that can be refit by feel alone with “moderate” confidence with no metric or statistical studies confirming this, which may prove more useful in reassociation than feel alone.

The present study applies two-dimensional measurements to the articular surfaces of 25 atlanto-occipital joints in order to assess the congruency and asymmetry of the joint. If the surface of this joint is unique within individuals, no significant differences should be found between the corresponding articular surfaces. However, significant differences should be observed when articular surfaces are compared between individuals (forced mismatch). Asymmetry of the joint, if present, may present another useful character to include in the reassociation process.

Results indicate that the morphology of the atlanto-occipital joint is not sufficiently unique within an individual to support or exclude reassociation. Certain measurements were found to be significantly different between the atlas and occipital of a single individual, indicating that a large metric discrepancy should not automatically be used to exclude elements from reassociation. Asymmetry of either element is not commonly found within individuals, and notable asymmetry in both elements may be included as support for reassociation.