

Chronology Building in Southern Mesoamerica: Comment on Love

Takeshi Inomata, Bárbara Arroyo, and Eugenia J. Robinson

Love (2018) misunderstands some concepts of Bayesian analysis and the data from Naranjo and Urías. The cross-dating of El Ujuxte needs to be reevaluated with the publication of its ceramic data.

Keywords: Kaminaljuyu; radiocarbon dates; Bayesian model

Love (2018) malinterpreta algunos conceptos del análisis bayesiano y los datos de Naranjo y Urías. Es necesario evaluar el fechamiento relativo de El Ujuxte con publicaciones de sus datos cerámicos.

Palabras clave: Kaminaljuyu; fechas de radiocarbono; modelo bayesiano

We welcome Love's (2018) contribution on the chronology of Kaminaljuyu. Despite the differences in our interpretations, we agree that the dating needs more work and discussion. Yet, given the limitations of the available information, we propose combining multiple lines of evidence instead of Love's focus on a small number of datasets. Important datasets include various sets of radiocarbon dates and ceramic cross-ties with diverse regions. Although any single dataset is insufficient to create a reliable interpretation, these multiple datasets exhibit a consistent pattern (Inomata et al. 2014). As Love notes, the ultimate test should be provided by new radiocarbon dates. For this reason, we have obtained a substantial number of new radiocarbon dates from Kaminaljuyu and Tak'alik Ab'aj. The forthcoming publication of these dates should eliminate most doubts about our revised chronology.

The issues regarding radiocarbon dating that Love raises are discussed in detail in the supplemental information accompanying our 2014 article. Here we briefly reiterate four of its main

points. First, our forward shifting of the chronology by 300 years did not result directly from Bayesian analysis, but from the identification of problems in the traditional chronologies. Bayesian analysis narrows down the probability distributions of radiocarbon dates, but does not drastically change them. Although Love advocates frequentist statistics, he presents intuitive interpretations of radiocarbon dates without statistical treatment. Second, researchers need to be aware of the effects of uninformative priors in Bayesian analysis, but our understanding of this concept differs from Love's. Whereas informative priors are based on observed data, uninformative priors are assumptions derived without empirical observation. In the analysis of radiocarbon dates, uninformative priors often are based on the assumption of the uniform distribution of radiocarbon dates. Contrary to Love's argument, radiocarbon dates, whether obtained with beta counting or AMS, are informative priors because they are empirical data.

Third, the main reason that we examined old sets of radiocarbon dates was to understand

Takeshi Inomata ■ School of Anthropology, University of Arizona, Tucson, AZ 85721-0030, USA (inomata@email.arizona.edu)
Bárbara Arroyo ■ Instituto de Antropología e Historia de Guatemala, Guatemala City, 01001, Guatemala
Eugenia J. Robinson ■ Middle American Research Institute, Tulane University, New Orleans, LA 70118, USA

Latin American Antiquity 30(1), 2019, pp. 224–226
 Copyright © 2019 by the Society for American Archaeology
 doi:10.1017/laq.2018.84

what went wrong with past chronologies. The question of beta counting is not a simple categorical one as Love argues. The main advantages of AMS dating are that it requires shorter counting times and smaller amounts of material, but this method does not guarantee better results (Walker 2005:23). It is true that radiocarbon dates obtained before 1980 need to be treated with caution. This is why we cross-checked different sets of dates. Differences between the Yale dates and the AMS dates are mostly within 100 years—smaller than the 300-year correction made by our revision.

Fourth, researchers need to develop strategies for interpreting radiocarbon dates that are tailored to local conditions. The mechanical elimination of certain dates without analysis as argued by Love may not be the best strategy for Mesoamerica. Where many buildings were repeatedly renovated through long occupation, old charcoal pieces can be included in fill materials. This problem applies to recent AMS dates as well. Thus, the primary concern should be the identification of problematic old dates, which requires cross-checking among multiple radiocarbon assays that are interrelated stratigraphically or through ceramic sequences.

We agree with Love that we all need to work to improve the quality of ceramic data. To this end, let us clarify the current state of ceramic studies at Naranjo. Arroyo originally placed its main occupation in the Las Charcas and Providencia phases, partly because the first set of radiocarbon dates fell between 700 and 400 BC, the traditional range of Providencia. Further analysis, however, led Arroyo to reassign most ceramics to the Las Charcas phase. In addition, Love's presentation of the Urías data is incorrect. We examined these data to date the Las Charcas phase and the transition to Providencia, not the Providencia phase and the transition to Verbena, as Love suggests. The Urías dates concur with those from Naranjo.

The characterization of our ceramic cross-dating as a narrow comparison with the Maya lowlands is unfair. We argue that a particularly important region was western El Salvador, which had close ceramic ties with Kaminaljuyu. Our analysis generally confirms Demarest and Sharer's (Demarest 1986; Demarest and Sharer

1986) dating of the Providencia and Miraflores (Verbena and Arenal) spheres. In retrospect, it is perplexing that the Kaminaljuyu chronology was not corrected after their study. Our comparison with the northern Maya highlands and the lowlands provides additional support for our revision.

The correlation with El Ujuxte is more difficult because its ceramic ties with Kaminaljuyu were weaker. Although the quantitative analysis of ceramics that Love advocates is important, its application to cross-dating is not straightforward. His own discussion of cross-dating relies on the presence-absence data. Although Love correlates Caramelo to Providencia, his Table 2 shows that a larger quantity of the Xuc ware, diagnostic of this phase, is found in the subsequent Cataluña phase. In addition, the waxy-slipped ceramics that he associates with Caramelo appear during the Las Charcas-corresponding phases in the Guatemalan highlands and Chiapas. Although Love uses the Santa Tecla ware to correlate Cataluña with Verbena, this ware first appears during Providencia. Likewise, the Fine-incised Black-Brown ware, the White-painted Orange ware, and the Usulután ware that he uses to tie Pitahaya to Arenal are also characteristic of Verbena. Thus, the cross-dating of Ujuxte remains unconvincing and needs to be evaluated with full publications of detailed ceramic data.

There is not space for commenting on Love's discussion of social process. Here we state only that, when the chronology is shifted by as much as 300 years, existing interpretations of process need to be reevaluated.

References Cited

- Demarest, Arthur A.
1986 *The Archaeology of Santa Leticia and the Rise of Maya Civilization*. Middle American Research Institute Publications 52, Tulane University, New Orleans.
- Demarest, Arthur A., and Robert J. Sharer
1986 Late Preclassic Ceramic Spheres, Culture Areas, and Cultural Evolution in the Southeastern Highlands of Mesoamerica. In *The Southeast Maya Periphery*, edited by Patricia A. Urban and Edward M. Schortman, pp. 194–233. University of Texas Press, Austin.
- Inomata, Takeshi, Raúl Ortiz, Bárbara Arroyo, and Eugenia J. Robinson
2014 Chronological Revisions of Preclassic Kaminaljuyú,

Guatemala: Implications for Social Processes in the Southern Maya Area. *Latin American Antiquity* 25:377–408.

Love, Michael

2018 Kaminaljuyu Chronology and Ceramic Analysis: An Alternative View. *Latin American Antiquity* 29: 260–278.

Walker, Mike

2005 *Quaternary Dating Methods*. John Wiley & Sons, New York.

Submitted July 12, 2018; Revised; Accepted December 6, 2018