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Grappling with Time and Space in the Lower Illinois Valley: A Retrospective and New Directions on Woodland Chronologies

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ABSTRACT

Archaeological research in the lower Illinois Valley (LIV) has long relied on ceramic typologies to construct regional chronologies and interpret social and cultural change. In this article, we revisit Stuart Struever's research program and argue that recent advances in radiocarbon dating and Bayesian chronological modeling provide new opportunities to continue his emphasis on multiscalar, data-rich approaches to understanding Indigenous societies. We first reassess regional chronologies using 87 radiocarbon dates from residential contexts and 104 dates from mound contexts, demonstrating that typologically defined chronologies obscure substantial temporal variation. We then develop a preliminary absolute chronology of the Mound House site using 22 radiocarbon dates integrated with stratigraphic information and interpreted within a Bayesian chronological framework. Together, these analyses demonstrate the need for high-resolution, site-specific chronologies as foundations for reconstructing institutions, social networks, and processes of change across the LIV.

KEYWORDS

radiocarbon; chronology; ceramics; Woodland

Introduction

Across the lower Illinois Valley (LIV; Figure 1), Stuart Struever founded a research program rooted in big data that addressed important social, political, and economic questions about the Indigenous societies of the midcontinent. Struever's multiscalar approach to space and time bolstered his commitment to exploring questions that were concerned first and foremost with human behavior. He aimed to challenge dominant normative perspectives and to highlight, capture, and leverage the full range of variability observed in the archaeological record toward substantive anthropological theorizing. This approach necessitated both a body of theory that could be used to make sense of this variation and archaeological methods that could be used to precisely track this variation in space and time.

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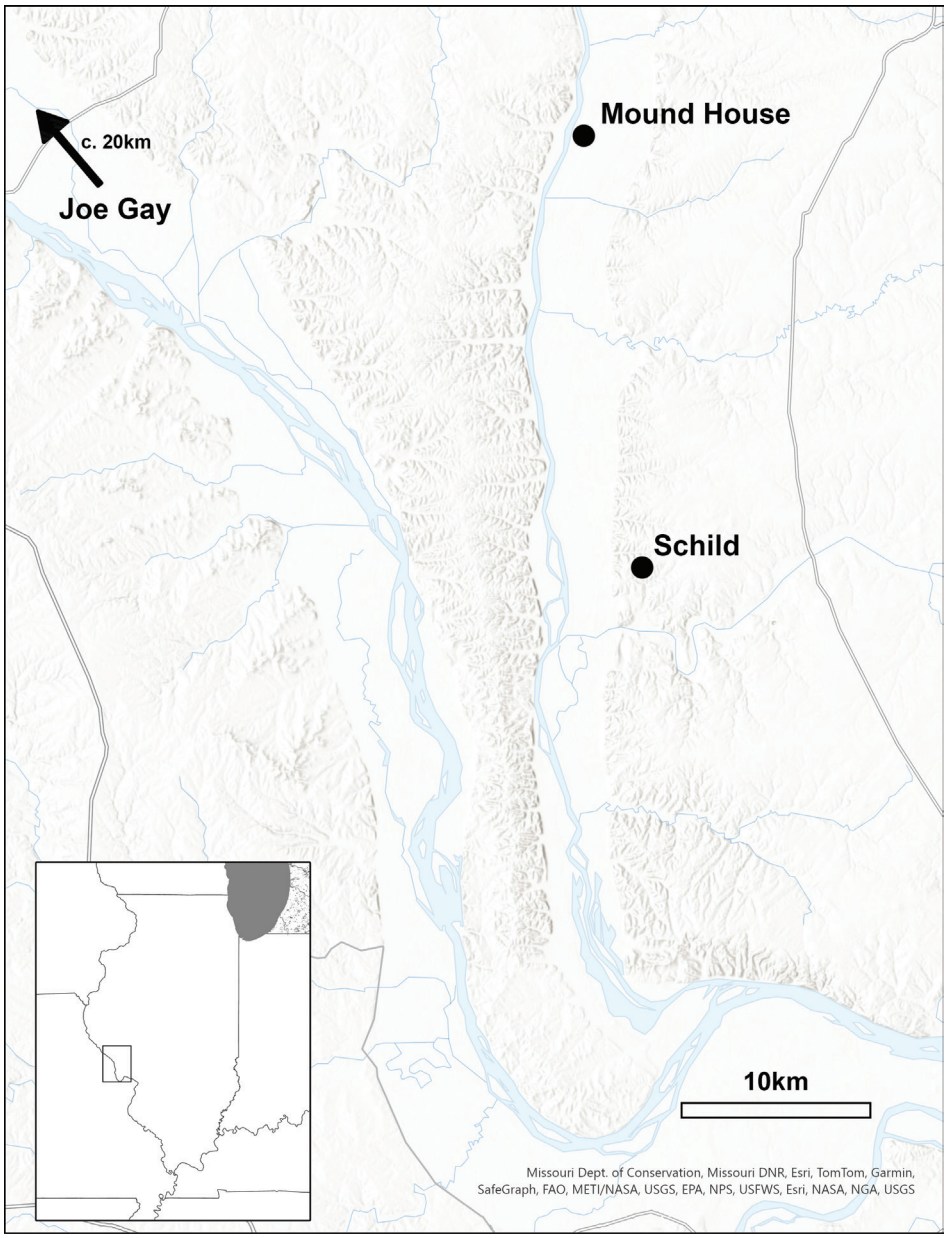


Figure 1. Map of the lower Illinois Valley with sites mentioned in text. (Esri basemap imagery sources: Missouri Dept. of Conservation, Missouri DNR, Esri, TomTom, Garmin, SafeGraph, FAO, METI/NASA, USGS, EPA, NPS, USFWS, NGA.)

Many of Struever's theoretical perspectives and concepts endure and thus are readily applicable to twenty-first-century archaeology. Indeed, Struever's fundamental views about research design, data requirements, and interpretation remain just as relevant today as they were 60 years ago. Struever's big questions primarily focused on subsistence-settlement systems, demographic reconstruction, and cultural boundaries and population movements. From the household

to the LIV as a region and beyond, Struever was concerned with the multiscalar structures of these Indigenous societies and the articulations between multiple sociospatial scales. While we might argue that we have moved beyond these *specific* questions, we make the case here that the fundamental underlying thrust of these questions remains central to modern archaeological theorizing about social and political organization and change.

Indeed, we could reword or rethink Struever's questions with more up-to-date concepts, especially those adopted from recent anticategorical theorizing on social networks and institutions (Feinman and Neitzel 2020; Holland-Lulewicz 2021). Importantly, these contemporary concepts require us to update the frameworks within which we collect data and make sense of these data. The following updated research questions, modified with contemporary parlance, do well to capture Struever's original research program: (1) What were the shapes and structures of institutional arrangements across and beyond the LIV? (2) What are the material correlates of particular institutions at multiple scales? And (3) what was the shape, structure, and scale of social networks that gave form to sociopolitical relationships and provided the foundations for institutional arrangements? These are questions that are asked today by archaeologists around the world. At their core, approaches to answering these questions must rely on the kinds of data quality and requirements that Struever outlined 60 years ago: primarily anticategorical approaches that rely on large, empirical, multiscalar datasets to build models from the bottom up, capturing the full range of variability and diversity in social, political, economic, and religious relationships. Importantly, this research strategy relies on the use of absolute calendar dates, the abandonment (or at least critical skepticism) of artifact types as chronological markers, and the rejection of culture-historic periods and cultures based on those types as meaningful or useful analytical units.

For Struever, the major "yardstick" for measuring space and time across the LIV was ceramic variation, and these data remain an important indicator of time and space today. Adapting ceramic data to modern conceptual frameworks and research goals, however, means establishing rigorous, high-resolution chronologies to contextualize multiscalar approaches to finely detailed studies of style and technology. Beyond methodological adaptations, this also means that the questions we ask of our ceramic datasets must be adapted. Identifying types, categorizing sherds, or asking about "cultures" are no longer viable research programs. To these ends, this article takes a retrospective look at the history of ceramic studies in the LIV, including the scope and goals of these studies. We situate Struever's work in this historical trajectory and outline the theory and methods that Struever's LIV research program relied on to move beyond the normative aspirations of his contemporaries. Finally, we continue grappling with space-time variation in the LIV through the application of Bayesian chronological models to assess past and contemporary spatial and temporal frameworks deployed across the region.

Importantly, this article is not a standard review or list of Struever's accomplishments regarding ceramic typologies or chronological work. Instead, we take

the opportunity to more substantively engage with Struever's legacy and research program by highlighting how innovative, contemporary methods and theory, as applied to the LIV, are a continuation, extension, and expansion of much of Struever's ideas and perspectives. I (Holland-Lulewicz) never had the opportunity to meet Struever. I did, however, attend my first archaeological field school at Kampsville. Much of my formative training, exposure, and thinking regarding the archaeological record grew from my experiences in Kampsville, not just as a student but more recently as a collaborator who continues to return to the LIV.

Ceramic Studies, Disciplinary Trajectories, and the Lower Illinois Valley

Archeologists of the LIV have been grappling with ceramic data and, as an extension, spatial and temporal control for almost a century. Morgan (1985) offers a review of these studies, which we summarize here, stretching back to the first significant research in the 1930s by archaeologists from the University of Chicago (Cole and Deuel 1937). Cole and Deuel relied on the Midwest Taxonomic Method (McKern 1939) to identify sets of "phases," "aspects," and "foci," especially across what they identified as Woodland and Mississippian traditions. To do so, they leveraged site-by-site classifications based on decorative, technological, and morphological criteria. By the 1950s, archaeologists working in the central Illinois River valley were conducting seriations of decorative criteria via stratigraphically ordered assemblages to capture and classify spatial and temporal variation (Bluhm 1951; McGregor 1952). For the LIV, Griffin (1952) published a revision of Cole and Deuel's (1937) typology that was agreed on at the 1951 pottery conference held at the Illinois State Museum. This revised typology included 28 types grouped into three wares within the Middle Woodland period. While a series of studies have refined and complemented Griffin's (1952) work (Fowler 1952, 1955; McGregor 1958; Morse 1963; Taylor 1958; Wray and MacNeish 1961), the 1951 revision remains the primary reference and framework for classifying pottery in the lower Illinois Valley today.

In the 1960s, with the popularization of the "New Archaeology," processualism, and new disciplinary foci on using empirical frameworks to deduce human behaviors and historical processes, Stuart Struever and his students began to apply these new perspectives to the archaeology of the LIV. While his work did help refine and contribute to the ceramic chronology (Struever 1964), unlike his predecessors, this was not the driving force behind his research program. Instead, Struever used ceramic data to argue for actual interpretations about *people*. He argued that the material distinctions identified in the archaeological record could be correlated with, or used as proxies for, cultural distinctions (Struever 1965). In this way, decoration was an indicator of social and cultural diversity. Within this perspective, Struever reconceptualized the "Hopewell cultures" not as bounded and boxed entities situated concretely in space and time but as the entanglements of numerous regionally and culturally distinct social groupings (Struever

1965). As these perspectives began to be more fully developed, Struever recognized that traditional typologies were too general to detect the important small-scale distinctions required to identify regional microstyles, which could be used to capture the most important kinds of spatial and temporal variation that most closely approximated the relationships that structured and defined these social groupings. Along with his initial use of absolute radiocarbon-dating methods in the LIV (Struever 1968), Struever's perspectives, frameworks, and research goals were foundational to others aiming to investigate "social units," "communities," "social interactions," and "cultural change" (e.g., Braun 1977; Houart 1973, 1975). Such ideas and concepts were not at the forefront of early ceramic studies, but they began outpacing the usefulness of traditional typologies developed in prior decades.

Struever and his generation deviated most critically from his forebearers in what they wanted to use ceramic data *for*. In 1971, Struever published "Comments on Archaeological Data Requirements and Strategy." In this paper, he argued that archaeologists' theoretical concepts, perspectives, and overall research questions were shifting so rapidly that their methods and approaches to data were not effectively keeping pace. To answer big questions about evolutionary and social processes, we needed to concern ourselves with defining appropriate matches between data and questions. For Struever, these big questions included such issues as reconstructing subsistence-settlement systems, developing multiscalar population estimates for different sociopolitical units, and inferring aspects of past social structures. Summarizing his main points, Struever was essentially making calls for an abandonment of "normative" approaches. This was a significant call to expand the scope and scale of archaeological practice. Integrating multiple social and spatial scales, capturing full ranges of variability and diversity, and accumulating sufficiently large, detailed datasets were all critical for his new research agenda. Struever was essentially calling on the use of data-rich empirical studies to facilitate an anticategorical approach to the past, challenges we continue to struggle with today.

Within this framework, Struever employed ceramics as both his clock to tell time and his markers for human populations, their relationships, and behaviors. He even noted that the tasks that modern archaeologists take on require rigorous chronological frameworks (Struever 1971). We argue here that the recent developments in high-precision radiocarbon dating and high-resolution Bayesian chronological modeling allow many of Struever's data requirements to be met in the modern age. That said, Struever's big questions and the concepts of his time have evolved. Our research questions have changed, our vocabulary has changed, and our theoretical tools have changed. In keeping with Struever's calls 60 years ago, the main challenge is to make sure our methods and interpretive treatment of data are keeping pace with rapidly shifting theoretical and conceptual landscapes. Struever was essentially calling for "big data" approaches. We now have the capacity to take on this challenge.

While much of the twentieth-century cultural resource management (CRM) work and technical reports from the LIV after the broad implementation of Struever's research program and vision continued (and continue) to rely heavily on ceramic typologies for crafting archaeological narratives, more recent work has leaned more heavily on absolute dating efforts and on following in Struever's intellectual footsteps. Most relevant are efforts by King et alia (2011) to leverage radiocarbon data in a way that bypasses reliance on ceramic typologies (or other material typologies) and thus reconsiders historical, social, and political processes as they unfolded across the LIV during the Woodland period. Drawing on a dataset of both new and existing radiocarbon dates, King and colleagues (2011) finely tracked the temporality of mound-building traditions into and across the LIV. More specifically, they used this fine-scale temporal resolution to achieve a spatial resolution that allows broader theorizing on the actual movement and spread of peoples and traditions, initial occupational sequences, and the evolution of symbolic communities and institutions that crosscut sociospatial scales. In closing, they pointed out that their work was but a first step to testing many of the long-standing hypotheses about the Woodland period LIV and to achieving an analytical resolution that will allow for new questions and interpretations to be developed. They underscore the continued inadequacy of the currently available radiocarbon data for answering questions that require fine temporal resolution.

Following notable advances in radiocarbon dating since Struever's time and especially in the last 15 years (see Bayliss 2009), we are now well positioned to continue and to update these efforts. In the rest of this article, we use new developments in statistical analyses of radiocarbon dates to evaluate extant temporal frameworks for the LIV, present preliminary approaches to building microhistorical chronologies, and offer suggestions on which directions and efforts offer the most potential value for the archaeology of the lower Illinois Valley.

New Directions in Measuring and Modeling Space-Time in the LIV

Methodologically, possibilities today regarding the analysis and interpretation of radiocarbon data and chronologies were not conceivable just 15 years ago, let alone 60 years ago. The most important developments since Struever's time have been the introduction of accelerator mass spectrometry (AMS) dating and the application of Bayesian interpretive frameworks to radiocarbon data. The advent of AMS dating meant that the sample size needed for an accurate and precise radiocarbon age fell dramatically. Instead of large chunks of charcoal, we could now date individual seeds. The implications of this were that the amount of material excavated from any site that could be used for radiocarbon dating now exploded, meaning more dates in general. The quality of dates has also increased. Unlike conventional radiocarbon dating that relies on proxies of decay to estimate age, AMS dating allows archaeologists to directly measure the amount of ^{14}C left in a sample. Alongside advances in calibration, not only can we date more materials and samples, but also our results are now of higher accuracy and higher precision.

With an increasing number of dates, and a growing move toward a "dates as data" approach, Bayesian chronological modeling (see Bronk Ramsey 2009) allows archaeologists to build archaeological information (e.g., stratigraphy, associations, etc.) into the interpretation and analysis of AMS dates. Bayesian frameworks allow us to formally model, using both AMS dates and archaeological information, the occupation spans, start and end boundaries of occupation, and duration of archaeological contexts, whether those be the use of individual pit features or houses, the occupation of a village, or the use of a ceramic technology across a region. Archaeologists no longer need to rely on subjective "eyeballing" of dates; instead they can formalize confidence and error ranges in absolute data. Importantly, these Bayesian frameworks give us a formal structure for updating models and information, while also incorporating new knowledge or data into existing models (e.g., a new suite of radiocarbon data or new stratigraphic information).

More robust chronologies have been accompanied by, and indeed have driven, new advances in conceptual frameworks. The ability to measure more variation has been accompanied by new ways to interpret this variation. Most critically, archaeologists have moved away from "cultures" or "societies" and from "tribes" and "chiefdoms" toward empirically defined organizational structures. That is, archaeologists now aim to identify and define institutions and the ways they articulate with one another (Holland-Lulewicz et al. 2020; Kowalewski and Birch 2020), with these articulations being points of comparative analytical interest rather than entire "cultures." Similarly, organizational variability is no longer essentialized by way of cultural or organizational boxes like "Woodland" or "chiefdom." Instead, fine-grained data allow us to reconstruct social networks and relationships that actually constitute the foundational structures of sociopolitical institutions. That is, we leverage relationships as meaningful analytical units instead of essentialized categories.

In the following, we demonstrate how new methods and techniques allow us to reconsider and refine the chronologies and social histories of the LIV. To do so, we approach two different scales of analyses. At the regional scale, we reassess extant radiocarbon data and temporal assumptions about the cultural history of the region, demonstrating a mismatch between available data and current chronological understandings. Next, we consider the microhistory of a single site, Mound House, which figured heavily in Struever's research. We argue that internal variation over time at such important places is key to understanding and rethinking regional-scale trends and variation and for beginning to realize some of the goals that Struever articulated 60 years ago.

Regional Chronologies

To illustrate recent methodological advances and their impacts on reconstructing regional chronologies, we focus on one puzzling conundrum that has faced archaeologists of the LIV since Struever's day. More specifically, we evaluate how an essentialized approach to chronology building based solely on typologies and the

previous absence of high-resolution, high-precision absolute dating techniques are the culprits behind some long-standing chronological gaps and misunderstandings. The problem we address is the virtual absence of early Late Woodland (associated with so-called White Hall ceramics) cemeteries and burials. While such contexts and sites are abundant in the preceding Middle Woodland and later Late Woodland (associated with so-called Early Bluff ceramics), they are conspicuously absent as assignments to early Late Woodland cultural "boxes." One possibility, of course, is that early Late Woodland mortuary rites concluded with disposal practices that left no archaeological residues. We feel it unlikely that river disposal emerged as a dominant funerary rite, and while cremations are known for Late Woodland groups, their remains have been reported (Buikstra and Goldstein 1973). It is also possible that LIV residents abandoned the valley at the end of the Middle Woodland period and only returned in the later Late Woodland (Early Bluff ceramics). Again, this seems unlikely primarily because there are known early Late Woodland (White Hall ceramics) residential sites (Boesch 1994).

Two remaining possibilities—the most reasonable possibilities—are problems of chronology and misattribution of early Late Woodland burials. Sampling biases against discovery of Early Woodland sites and inadequate models for ordering assemblages on temporal scales are the most likely proximate causes. We have several hundred radiocarbon dates from Middle Woodland and Late Woodland residential and mortuary contexts, and there is a working chronology for the LIV. We should be concerned, however, with how the assumptions that anchored these chronologies over the last 60 years, especially the reliance on ceramics, have influenced our ability to tell time. Are these even adequate and of the resolution necessary to tackle problems like the one presented here?

We begin to address this problem by considering chronology and its construction, existing datasets, and radiometric data from residential and cemetery sites. We report results from new Bayesian analyses of existing radiocarbon dates focused on identifying possible early Late Woodland mortuary contexts. We argue that early Late Woodland mortuary data do indeed exist in our collections and datasets and that the inability to see them is the result of insufficient temporal data and typological thinking about assemblages and sites.

The regional chronology for the LIV is primarily defined in terms of ceramic assemblages. Based on ceramic chronology, early Late Woodland White Hall residential sites should exist. But are ceramic chronologies adequate for addressing chronology in mounds and mortuary contexts? To address this question, we queried a database of burial data that includes most excavated LIV Middle Woodland and Late Woodland mound sites. Of 2,687 burials, only 486 (~18%) were associated with artifacts. Only 4.8% were associated with ceramic vessels or sherds. Ceramics are thus relatively rare with Middle and Late Woodland burials overall. Even so, sites are often assigned to ceramic-derived phases based on associated ceramics or, secondarily, by artifacts assumed to be correlated with specific ceramic types. The underlying assumption is that the trajectory and rate of change

of all data classes are highly correlated. Sites without diagnostic material raise an additional conundrum. All tumuli within a mound group may be assigned dates based on one or two "diagnostic" artifacts recovered from a single structure.

To address these chronological challenges, we undertake a reanalysis of radiocarbon data via a Bayesian interpretative framework. We use 87 dates from residential sites, split into time periods via ceramic associations—Middle Woodland, early Late Woodland (White Hall), and later Late Woodland (Early Bluff and Jersey Bluff). To compare the chronologies of residential and mound contexts, we model 104 dates from mounds, split into three temporal periods based on artifacts, mound architecture, and mortuary practices—Middle Woodland, early Late Woodland, and later Late Woodland. Models were built in OxCal v. 4.4 (Bronk Ramsey 2009) using the IntCal20 calibration curve (Reimer et al. 2020). Dates, calibration ranges, and modeled results can be reproduced using the OxCal code (see Supplementary Material).

Figure 2 represents regional chronological models built directly from dates associated with residential sites assigned to temporal periods based on ceramic typologies. Settlements associated with Middle Woodland ceramics are modeled to have been occupied beginning circa cal 60 BC–AD 50 and to have ended circa cal AD 290–380. There is a potential gap of a minimum of 70 years between models based on currently available dates for sites with Middle Woodland series ceramics and residential sites with early Late Woodland White Hall ceramics, which are modeled to have been occupied beginning circa cal AD 450–540. The end use for White Hall ceramics at residential sites is modeled to have been circa cal AD 660–720, at the same time as residential sites began to yield Late Woodland Early Bluff ceramics, circa cal AD 640–730. In fact, there may be a 70-year modeled overlap between the use of White Hall and Early Bluff ceramics at residential sites. Early Bluff pottery ceases to be used at residential sites circa cal AD 690–800, followed closely by the adoption of Late Woodland Jersey Bluff ceramics circa cal AD 910–1150.

The results of modeling regional settlement chronologies using ceramic typological assignments as priors to estimate chronological ranges indicate a continuous residential occupation throughout the valley, with ceramic styles, technologies, and characteristics blending into one another, even overlapping significantly in some cases. The conventional chronological narratives for mounds, however, is that White Hall, or early Late Woodland, mortuary practices are conspicuously absent. Indeed, when Middle Woodland and Late Woodland mounds are modeled using ceramic and/or other typological assignments, which impose prior information on the interpretation of radiocarbon data, there is a significant gap between the two of approximately 120–310 years. If we look closer, however, this gap seems to be an artifact of a typological scaffolding that has driven chronological narratives across the lower Illinois Valley for over a century.

There are two sites, specifically, that require reevaluation: Joe Gay and Schild. Joe Gay Mound 6 is one of a group of mounds located on the bluffs above Horton Creek, where it enters the Mississippi Valley. Gregory Perino describes Mounds 1, 2,

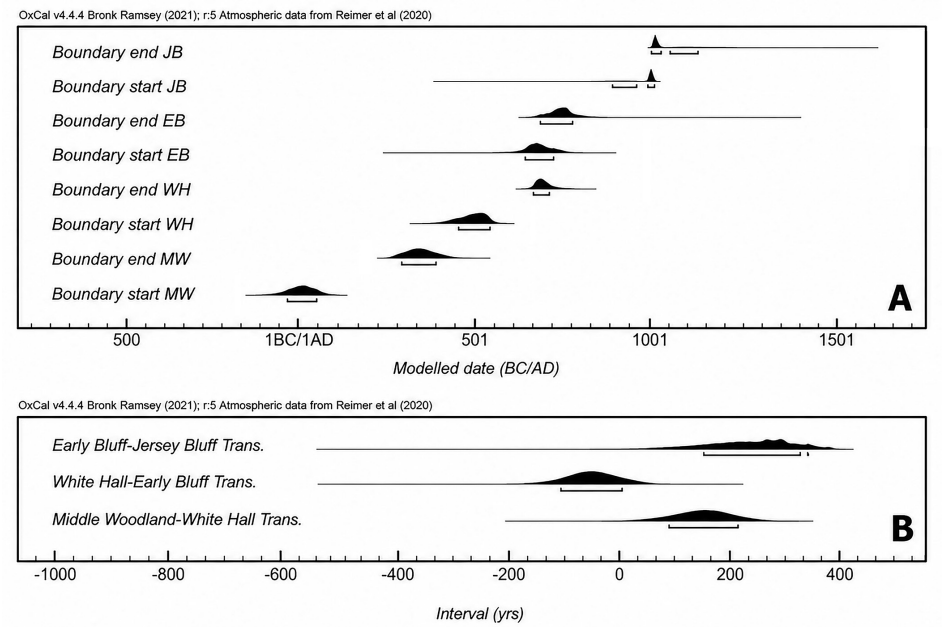


Figure 2. Regional chronological models for the occurrence of Woodland ceramic types at residential sites across the lower Illinois Valley. (A) Modeled start and end boundaries for the uses of ceramic types at residential sites and (B) modeled transition spans between the uses of chronologically ordered ceramic types at residential sites.

and 5 as solely Middle Woodland and Mounds 3, 4, and 6 as small Hopewell mounds with Late Woodland additions (Perino 2006). Their "Hopewellianness" was judged based on their placement in a "Middle Woodland style" log tomb and ramp structure. All other burials were judged Late Woodland. No artifacts were found with this individual. Only Burial 21 was associated with artifacts: two Late Woodland sherds.

The Schild site consists of 12 mounds and two cemeteries at Dayton Hollow (Perino 1971). Perino excavated Mounds 1–9, all Late Woodland structures, and two Mississippian cemeteries. Mound 4 included portions of at least 16 individuals interred in 11 graves. No artifacts were found in association with any burials. Several other unmodeled dates correspond to this period. We do not have space to discuss them all in depth, but all are characterized by an absence of associated artifacts or ambiguous and nondiagnostic associations. For example, EZ 10–14, EZ 9 Feature 1, and KO 5–18/19 all include platform pipes similar to Middle Woodland pipes, though not quite identical (Perino 1971). The Mound House samples, though they date during the early Late Woodland, come from a pit feature that included a wide variety of Middle Woodland *and* Late Woodland artifacts.

All of these contexts represent good candidates for early Late Woodland assignments or at least should *not* be assumed, as they have been, to be Middle or Late Woodland based on loose typological characteristics (or lack thereof). To these ends, we generated a new model with these early Late Woodland (equivalent to White Hall) candidates as a single phase and included them as a sequence

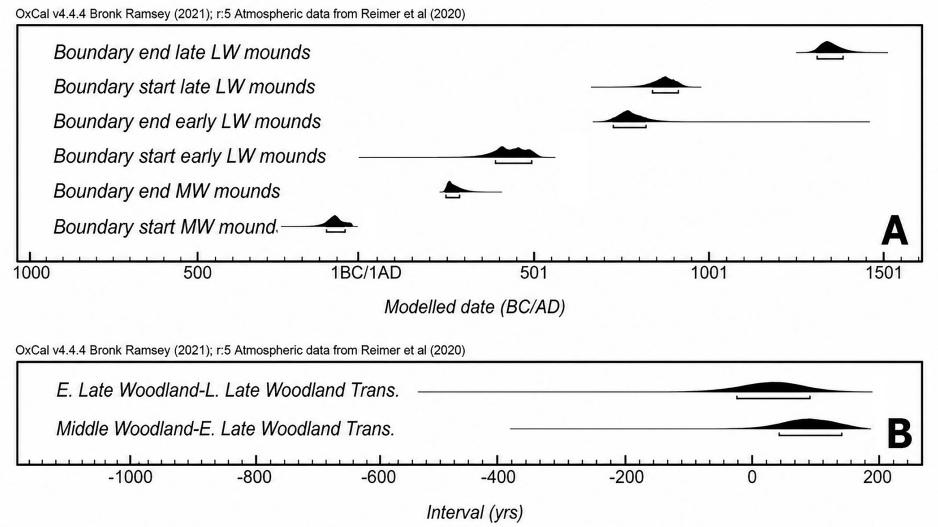


Figure 3. Regional chronological models for cultural-temporal assignments of Woodland mounds across the lower Illinois Valley. (A) Modeled start and end boundaries for cultural-temporal mortuary types and (B) modeled transition spans between chronologically ordered mortuary types.

between our Middle Woodland mound dates and our later Late Woodland mound dates (Figure 3). It is not surprising that these samples bridge the early Late Woodland gap. We structured the model to do so. Bayesian frameworks are not meant to accept, reject, or test hypotheses, so we cannot necessarily accept that this "fixes" our chronological sequence or "fills" our temporal White Hall burial gap or that this model even represents the real chronology. We might certainly say that this model's structure and our currently available radiocarbon and archaeological data are compatible with one another, but much more work is needed on the ground to confirm or reject our experimental model construction.

Still, no burials have been identified with White Hall sherds, so we cannot say that we found White Hall burials. They may indeed not exist, because early Late Woodland people did not choose to incorporate those vessels into their funerary rites. Some burials, however, likely do date to this time period. These "results" should be considered provisional—a model to be tested. Many more radiocarbon dates from burials are needed to increase the resolution of temporal analyses of cemeteries, especially in the many contexts without artifacts. A few pots or sherds per mound, or per site, are not enough to capture temporalities of mound use nor a few dates.

In this regard, if we are to rebuild from the bottom up, we need to set our sights on creating a critical mass of microhistories from sites across the LIV. We need many dates from individual sites to firmly situated ceramics, practices, and traditions in time at specific places. This is important because stratigraphy and information directly from the archaeological record concerning the relationships

between dates serve as some of the most informative and powerful priors we can build into our models to estimate date ranges and produce tight, high-precision chronologies. From here, we will be able to synthesize modeled age ranges, starts, ends, and spans at the regional level. But the real work needs to begin with intensive chronology research at the scale of individual sites.

Microhistories

Before we can begin to realize some of Struever's ideals and contribute meaningfully to a twenty-first-century archaeology of institutions, networks, and sociopolitical organization, as Struever himself pointed out (1971), we need rigorous chronological frameworks that start from the bottom up: precise, accurate chronologies for individual places and sequences. To these ends, we focus the rest of our discussion on our renewed preliminary-dating efforts of one socioceremonial center in the LIV: Mound House (Figure 4), a site that figured heavily in Struever's interpretations of the Middle Woodland period (Struever and Houart 1972).

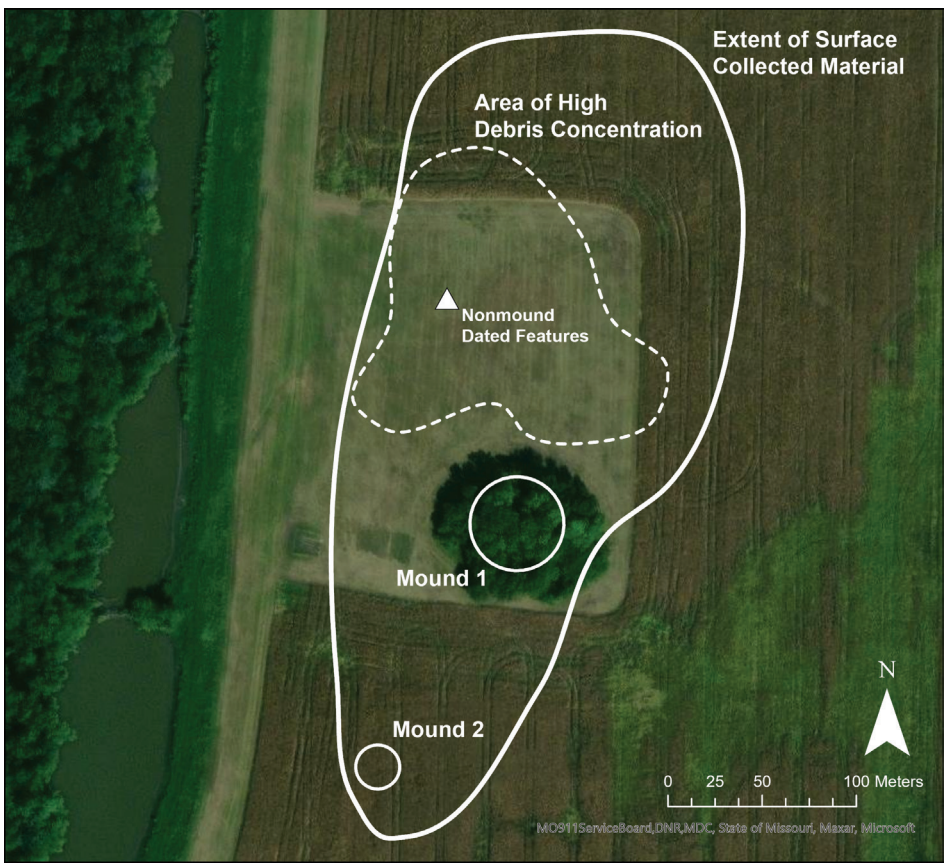


Figure 4. Map of the Mound House site, with locations of mounds and primary "habitation zone" depicted. (Esri basemap imagery sources: MO911ServiceBoard, DNR, MDC, State of Missouri, Maxar, Microsoft.)

The Indigenous community at Mound House consisted of multiple burial mounds surrounding a broad, open space located in the floodplain of the LIV. Mound House was likely used as an important, meaningfully charged place occupied seasonally by a dispersed regional community. In our modern parlance, Mound House likely served as a critical node within wider social networks that spanned the LIV and potentially beyond. Its location within these broader networks and its relationship to both local communities and other ceremonial floodplain centers remain ambiguous and necessitate further research.

Mound House likely served as an important place for members of an institution situated at a scale between households and the LIV region. Mound House and other floodplain aggregation centers may reflect institutions analogous to clans or moieties. Though this remains speculation, it is likely that the regional institution Mound House represents would have articulated with others at many other social and spatial scales, from households, kinship groups, lineages, and so on. It also likely served as a central node within a dense subnetwork of broader regional relationships and connections, much like other floodplain centers.

Understanding temporality is key for fully appreciating these broad institutional arrangements and the position of Mound House across broader social networks. If ceramic variation is to be used to reconstruct institutional arrangements and network structures at the regional scale, analogous to how Struever would have wished to use them, then time and temporality must be controlled for at the microscale. While much has been written about Struever's subsistence-settlement systems, floodplain versus bluff-top mounds, local and regional communities, and the like, much of this work has been produced without fine chronological control (see King et al. 2011), primarily because only recently have we been able to achieve the required resolution and precision.

To date, there are 10 available dates from a single mound at Mound House, Mound 1, and just two dates available from nonmound contexts. To this we add 12 new AMS dates from nonmound habitation contexts (Table 1). We use a Bayesian interpretive framework to leverage these 22 dates in the preliminary construction of an internal history for Mound House. Most substantive for these modeling efforts is incorporating stratigraphic information into our interpretation. These preliminary modeling efforts are simple, incorporating the association of dates and the contextual relationships between dates into basic models that order dates in sequences based on their stratigraphic positions. We do this for one of the mounds, Mound 1, and for two pit features excavated from habitation areas at the site. All models were built in OxCal v. 4.4 (Bronk Ramsey 2009) using the IntCal20 (Reimer et al. 2020) calibration curve. Code that evaluates model structure and replicates results is included as Supplementary Material.

In modeling Mound 1 dates (Figure 5), we produce a modeled use-range that begins with submound deposits and features that start circa cal 60 BC–AD 100 and end circa cal AD 120–200. It is possible that these submound deposits represent considerable time, but in evaluating the individual dates, the earliest

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Table 1. Radiocarbon Dates from the Mound House Site.

ID	Site	Provenience	Context	^{14}C age (BP)	±	Calibrated (cal AD, 68.3%)	Modeled (*cal AD*, 68.3%)	Citation
PSUAMS-16159	Mound House	F380-03A 1 unfin#1	Habitation	1745	20	250–350	*320–380*	This article
PSUAMS-16160	Mound House	F380-03A 1 unfin#7	Habitation	1720	20	250–380	*330–380*	This article
PSUAMS-16161	Mound House	F380ext-01A 5 unfin#69	Habitation	1690	20	260–410	*350–400*	This article
PSUAMS-16162	Mound House	F390ext-01A 5 unfin#80	Habitation	1700	20	260–410	*350–401*	This article
PSUAMS-16163	Mound House	F383-02A 10 unfin#121	Habitation	1670	20	370–420	*380–420*	This article
PSUAMS-16164	Mound House	F383-02A 1 unfin#3	Habitation	1530	20	540–580	*430–570*	This article
PSUAMS-16165	Mound House	SQ609-04D 5 unfin#73	Habitation	1625	15	410–530	*410–530*	This article
PSUAMS-16166	Mound House	SQ613-03E 1 unfin 201-1	Habitation	1700	20	260–410	*350–410*	This article
PSUAMS-16167	Mound House	SQ613-03E 2 unfin#41	Habitation	1615	20	410–540	*410–480*	This article
PSUAMS-16168	Mound House	SQ613-03E 1 unfin#17	Habitation	1760	20	240–340	*300–380*	This article
PSUAMS-16170	Mound House	SQ613-09-Baulk 1 fin#106	Habitation	1880	20	120–210	*170–240*	This article
PSUAMS-16171	Mound House	SQ613-09-Baulk 1 fin 201-1	Habitation	1780	20	240–330	*210–300*	This article
ISGS-2974	Mound House	Feature 260-08-01	Submound	2040	70	-160–70	*1–130*	Buikstra et al. 1998
ISGS-2973	Mound House	Feature 259-02A	Submound	2010	70	-100–120	*10–140*	Buikstra et al. 1998
ISGS-2970	Mound House	Feature 227-04	Submound	1960	70	-50–160	*20–140*	Buikstra et al. 1998
ISGS-2548	Mound House	Feature 230	Mound, Redeposited midden surface	1940	70	10–210	*120–210*	Buikstra et al. 1998
ISGS-2969	Mound House	Feature 262-03	Submound	1940	70	10–210	*30–150*	Buikstra et al. 1998
ISGS-2972	Mound House	Feature 252-02	Submound	1910	70	20–220	*40–150*	Buikstra et al. 1998
ISGS-2971	Mound House	Feature 258-05-1	Mound, Redeposited midden surface	1900	70	60–230	*120–210*	Buikstra et al. 1998
ISGS-2976	Mound House	Feature 232-1, 4-6	Mound, Redeposited midden surface	1850	80	80–330	*120–211*	Buikstra et al. 1998
ISGS-2549	Mound House	Square 78-08/09b	Intramound Surface	1820	70	120–330	*140–250*	Buikstra et al. 1998
ISGS-2975	Mound House	Feature 258-05-2	Mound, Redeposited midden surface	1800	70	130–350	*120–210*	Buikstra et al. 1998

10/23/26 9:28 AM

absolute date modeled to circa cal AD 1–130, while all submound dates have potential ranges that span up to between AD 130 and AD 150 at the latest. As such, these submound deposits and features may all be contemporaneous and represent a much shorter amount of time than suggested by the modeled start and end ranges and may potentially represent a single event. For the first layer of Mound 1, added directly on top of these features and the ground surface, these activities form a continuum with submound activities, beginning between circa cal AD 120 and AD 210. The single date from the interior of the mound (cal AD 140–250) is coeval with the original, initial mound layer atop the submound deposits. In general, this suggests that Mound 1 was built rapidly, almost instantaneously, and is likely directly related to submound activities.

Modeling of 12 new AMS dates from habitation contexts (Figure 6) indicates that all three of the nonmound features tested postdate the initial construction of Mound 1, with the earliest dated nonmound feature beginning to be used circa cal AD 130–240 and the latest of these dated nonmound features beginning circa cal AD 280–420. To us, this indicates that the actual construction and use of the mound constitute a single type of activity that designated this place as important. After the initial building of Mound 1, Mound House site continued to be used for at least 300 more years. Put another way, the collective institutions reflected in Mound

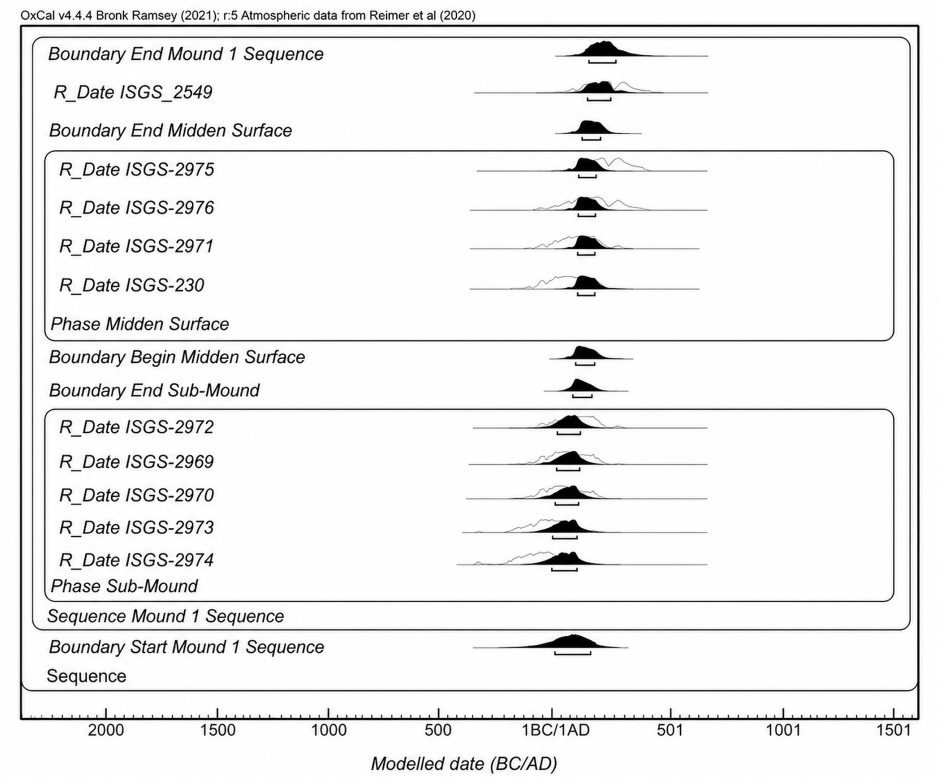


Figure 5. Modeled dates for Mound 1 at the Mound House site.

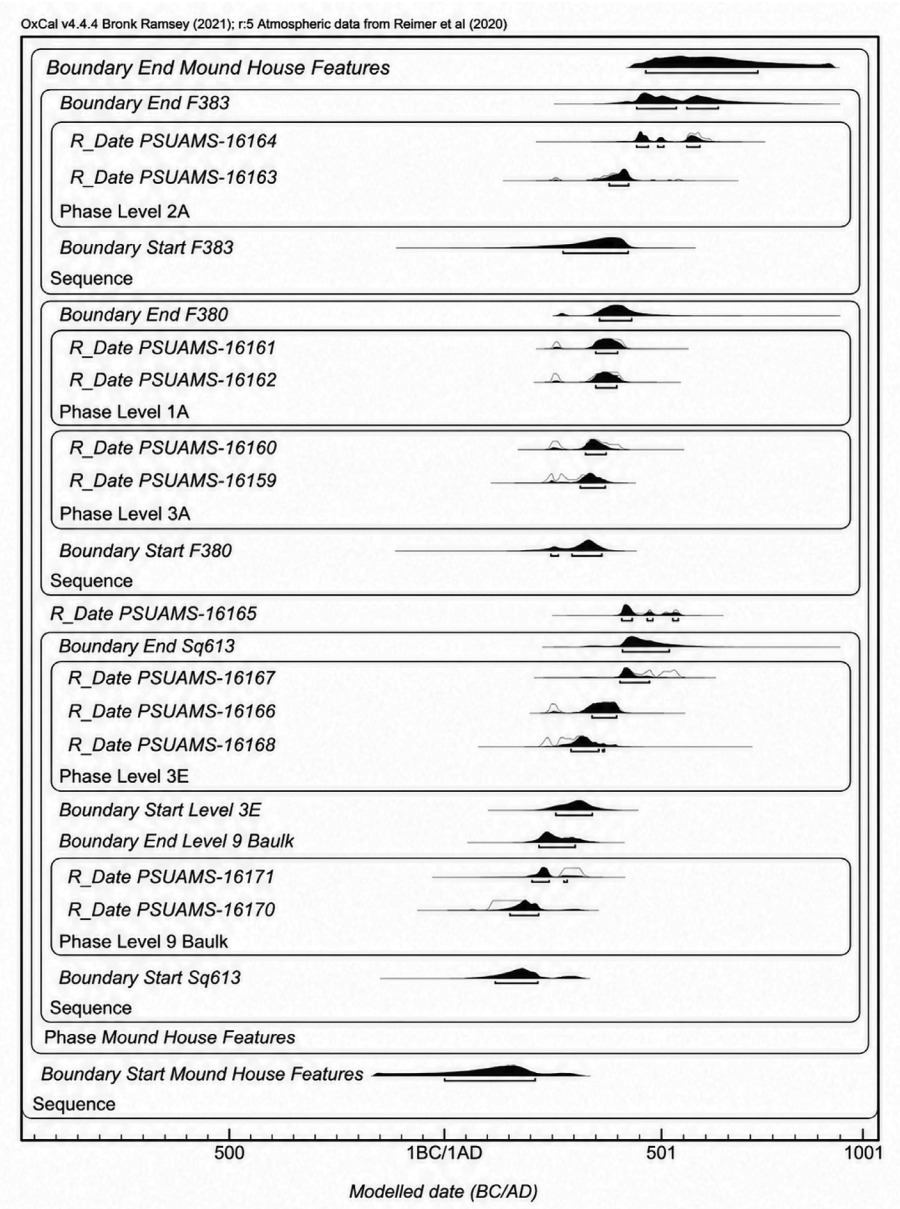


Figure 6. Modeled dates for habitation contexts at the Mound House site.

1's construction and use seem to have been durable anchors through which local communities were integrated. This longevity may also indicate the enduring role of Mound House as an important node within wider network structures. The exact nature of this role and its change over time remain to be understood, though these microhistories are a critical prerequisite to following these threads.

The dated features underscore further significant details. First is the enduring use of a single area over time. Modeling AMS dates using stratigraphic information,

one large feature measuring 3.5 m by 4 m and up to 1 m deep (represented by stratigraphic units in SQ13) may have been used for more than 100 years, beginning circa cal AD 130–240 and ending circa cal AD 410–520. This is important, as even individual discrete features may represent significant spans of time. Returning to the implications that these microhistories have for understanding ceramic assemblages, variability is critical: mixes of grit-, limestone-, and sand-tempered pottery and at least eight distinct surface or stylistic treatments populate this feature. There is no way to use our culture-historic periods or types to meaningfully make sense of this variation. An outdated research program or set of concepts would use this variation to identify the presence of types and, thus, of "peoples" and "time periods" represented. This is a prime example of methodologies and data treatment not keeping pace with advances in concepts and theory. The presence or absence of "types," within modern conceptual frameworks, is meaningless. Types are not a reflection of any kind of human behavior. Raw variation in attributes and their co-occurrences are, however, proven and reliable proxies for human behaviors. We should understand raw variation in ceramic attributes as reflective of substantive connections, relationships, and institutions assembled at Mound House.

Looking at another feature, a smaller pit feature (Feature 380), full of ceramics and with a complex depositional history, we note that the modeled dates cluster closely, likely indicating a single fleeting use. Without absolute dates, the temporalities of these features, and their utility for bracketing ceramic variation, would be unknown to us. The duration of feature use and the ceramic variation captured across that duration of use are absolutely critical components for reconstructing institutions and networks. While this article represents simply a first step at chronological precision, this kind of temporal control is needed to leverage ceramic data toward research questions we should be asking in the LIV. Being able to interrogate ceramic variation at high chronological resolution is key to understanding the multiscalar arrangements and patterns that Struever sought to illuminate. Just as Struever sought to calibrate chronologies and assemblages across sites and regions, these microhistories will only find meaning at the macroscale when we begin to reach a critical mass of high-resolution intra-site chronologies across the region.

Discussion and Conclusion

Though originally invited to represent Struever's contributions to studies of ceramics, we believe that focus was too narrow to fully capture Struever's contribution and that there is just too much to do before we really begin to revisit, rethink, and recast the study of ceramics in the LIV. While I (Holland-Lulewicz) did not know Struever, given our shifting theoretical and conceptual frameworks, I think he might agree. Following his call for adaptive research and archaeological practice, we would suggest the following for research in the LIV that builds on and expands Struever's original program. We need more dates to contextualize more

extensive intracommunity sampling and more detailed ceramic attribute analyses to facilitate robust reconstructions of institutions and networks.

We also need to begin investigating time and constructing chronologies in a manner that recognizes that all data classes, regardless of site type, are not on the same trajectories and are not changing at the same rate. As Lynne Goldstein wrote regarding plummets across the midcontinent: "That plummet styles seem to continue through time suggests that certain artifact classes may undergo stylistic change more slowly than others" (2004:97). That certain lower Illinois Valley funerary treatments seem to change in a manner different from ceramic types suggests that each needs to be calibrated separately as these cultural elements may change in a manner distinct from one another; lower Illinois Valley people who used "White Hall" ceramics may not have chosen to bury these ceramics with their dead. Greater attention to time and variation through better radiometric samples, calendric analyses, and chronologic modeling will only help us reveal and understand processes of change. Most importantly, however, recognizing the multiple, overlapping, and sometimes potentially contradicting temporalities of different materials, practices, or traditions allows us to track the multiple, overlapping, and sometimes potentially contradicting temporalities of human institutions, organizations, and networks. Right now, our temporal/cultural "black boxes" do not allow us to disentangle the many varied facets of Indigenous lives and societies in the lower Illinois Valley. Community organization, ritual practices, subsistence strategies, ceramic typologies, mortuary practices, and the like are all included in agglomerative Frankensteins of culture-historic boxes that do not allow us to understand how all of these institutions articulate with one another in unique ways at any one point in, but especially not across, time.

This is the work that needs to be done in the LIV. Quite frankly, we have the materials and we have the collections, but it remains a matter of now adapting our research methodologies and interpretive concepts and recalibrating our data requirements. Kampsville archaeology has always tracked closely with theoretical and practical changes, indeed has led many of these changes; there is no reason to stall now.

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Supplementary Material

Supplementary material for this article can be found at https://www.midwestarchaeology.org/mcja/supplemental-materials.

Supplemental Code 1. Bayesian model and dates used to model regional ceramic traditions, their overlap, and the differences between their age ranges

Supplemental Code 2. Bayesian model and dates used to model the chronology for Mound 1

Supplemental Code 3. Bayesian model and dates used to model the chronology for non-mound contexts

Declaration of Interests

The authors declare no competing interests.

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MCJA 52_1 Holland et al.indd 22 10/23/26 9:28 AM