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Missing Links in the *chaîne opératoire* of Citation: The Limitations of Systematic Literature Search in The Social Sciences and Humanities

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Abstract

The *chaîne opératoire* is a concept used in archaeology to describe the sequence of interactions with a material object that transform it from raw material to object-in-use, and eventually to disposal. In the context of materiality theory, the concept has been used to identify the varieties of other objects, individuals, and social conditions implicated in the [life] of a seemingly singular object.

The object at the heart of this study is the scholarly literature on the zooarchaeology of the Bronze Age in the South Caucasus. Three corpora are composed, taking three distinct approaches, in order to map the object of study via triangulation. Two alternative methods of systematically exploring the literature are chosen. A genealogical approach (Corpus 1) begins with the "forefathers" of what was then called Transcaucasian archaeology and follows the citations of that work forward. An archaeological approach (Corpus 2) uses a small set of recent publications, highly relevant to the zooarchaeology of the Bronze Age South Caucasus and follows their references backward. The final corpus (Corpus 3) is the bibliography of the first full draft of a doctoral dissertation, assembled by a doctoral student in the US-based tradition of anthropological zooarchaeology (this work is auto-ethnographical). By identifying the citation and collaboration networks within which each corpus is situated, we can reconstruct the temporal, spatial, and interpersonal conditions of knowledge production.

This analysis has two aims. First, to test the application of a systematic approach to the literature of a largely book-based, multi-language field of research. Second, the results should show how well the knowledge represented in the dissertation, as originally drafted, reflected the field, as a whole, and whether there are identifiable research communities with which the research did not initially engage. The three corpora reveal three distinct constellations of actors studying the Bronze Age in the South Caucasus. The context of archaeological knowledge production includes the history of archaeological practice in Europe and Southwest Asia, relationships of status, and resource inequality. A systematic approach may expose the implicit geographic, temporal, and institutional patterns of knowledge production influencing the dissertation, highlighting the traditions the dissertation draws from, the discourses it contributes to, and the literature missing from consideration. A comparison of these corpora reveals the consequences of these conditions, identifying scholars and traditions of scholarship, to chart a landscape of scholarship that extends beyond what is "known" according to standard practices in archaeological research. This comparison, thus far, simultaneously highlights the limitations and the advantages of systematic literature review and the usual, ad hoc approach.

This work consists of both qualitative and quantitative analysis, which is called for by the irregular nature of the underlying data. The quantitative analysis consists of an overlap analysis, of the publications most cited within each corpus. The qualitative assessment of the results draws upon the history of archaeological practice, research funding, and social networks within which these publications and citations are situated.

Introduction

This research in progress considers qualitative factors and systematic, quantitative analysis to approach the background literature for anthropological archaeological

research into the effect of human-animal relationships on sociopolitical organization and the establishment of political authority in the South Caucasus during the Bronze Age. I combine systematic approaches to literature selection with auto-ethnography, reporting the process by which a doctoral student in the US-based tradition of anthropological zooarchaeology assembles a bibliography. This simultaneously highlights the limitations of bibliometric approaches to systematic literature review in a book-based, multi-language field, and the limitations of the usual, *ad hoc* approach.

To approach the universe of scholarship relating to the subject of the dissertation, I compile three corpora, from which I derive three overlapping constellations of actors. Later work will draw on information about these scholars, and the concepts that their research has covered. This research asks how well the knowledge represented in each of these approaches reflect the field as a whole, and which scholarly communities are lost in each.

Archaeological knowledge production takes place in the context of the history of archaeological practice in Europe and Southwest Asia, relationships of status between senior and junior scholars, and geographically determined resource inequality (including both research funding and time). A systematic approach is well-suited to recording the consequences of these conditions (where that scholarship which engages most actively with an international community becomes more visible), and it also has the potential to chart a landscape of scholarship that extends the boundaries of the "known world". It explores the geographic, temporal, and institutional patterns of knowledge production influencing archaeological research, to articulate clearly what traditions the dissertation as originally drafted had drawn from; what discourses it contributed to; and what literature was missing. What such a systematic approach may miss is scholarly literature produced with different practices of formatting, publication, and dissemination.

Background

Approaching this study requires understanding the practices of research output in the social sciences and humanities, the background of the digital resources available, and the history of archaeological knowledge production in the region of the South Caucasus.

The social sciences and humanities are a challenge to digital bibliometric datasets. They often rely on non-article research outputs (e.g., books and conference presentations), not all of which are indexed, and multiple languages continue to be used for scholarly communication. In archaeological research local/regional archaeological publications are essential to knowledge dissemination and archives may contain one of few, or the only, example of research materials.

The Dimensions dataset includes one of the largest collections of metadata about research published around the world, with no geographic or temporal exclusions (the earliest publications date to 1665), as long as the metadata are digitized and made available either openly or through data sharing agreements. In principle, all languages are included. That said, there are limitations for all scholarly metadata providers. The most relevant limitation for the study presented here is a paucity of

scholarly output published in Russia. Despite the existence of Russian-language online digital libraries and metadata repositories, access to these resources has been blocked by the current geopolitical landscape, including governmental sanctions prohibiting contracts with Russian entities, and ethical constraints emerging from Russian national policy, including the situation in Ukraine. For example, eLibrary.ru contains over 70 million articles and 1.7 million books, and—according to its search interface, conference materials, dissertations, grants, and datasets, but it cannot be linked to existing databases. In the past, access was complicated by uneven adoption of CC0 licensing and open science expectations, which impacted both business models and infrastructure development. Clarivate had absorbed these data in the past, to sell the Russian Science Citation Index (PR Newswire, 2014), but that dataset is now defunct for geopolitical reasons (Scientific Publications, 2024). In considering other data sources, Lens.org had a smaller quantity of Russian-affiliated publications. OpenAlex and Dimensions have partially overlapping Russian-affiliated publications, with over 1.8 million publications in common. [Identify the fields where Dimensions has non-OA sources, and where OA has non-Dimensions sources?]

The origins of archaeology in the South Caucasus, as we would recognize it today, coincided with the completion of Russian imperial control of the region. This established a familiar relationship between political, social, and scientific knowledge which would persist well into the 21st century. The earliest published work, in the 1880s, was produced by Jacques de Morgan. An excellent educational system and access to reliable and sufficient resources produced generations of archaeologists, who were able to set, challenge, and test chronologies; explain technological and social innovations; and archaeologists in the region recorded remains from every period of human occupation, including the oldest hominid outside of Africa. Twice. The collapse of economic and political order in the 1990s led to twenty years during which young archaeologists found it difficult to find a professional position after their disciplinary training. Because stability returned without significant economic improvement, archaeologists in the South Caucasus became heavily dependent on research funded by international grants, from the US, Australia, Germany, France, and Italy. This led to shifts in the research agenda, and reevaluation of long-established facts (from chronological frameworks to the very idea of socioeconomic progress). My own work is embedded in that period, having begun in the early 2010s, when I could count on one hand the number of professional junior archaeologists in Armenia and Georgia. My academic and disciplinary training in the US drove me to identify explanations and logics that were unconvincing to my understanding of narratives of sociopolitical change. This gap-finding, historically critical approach to knowledge production risks the alienation of colleagues raised in different epistemological traditions and the loss of the intellectual labor of our scholarly predecessors.

Fortunately, several successful long-term partnerships of European, American, and Australian archaeologists with established figures in Armenian and Georgian archaeology have entailed respectful knowledge exchange. Although the attrition rate of young archaeologists between their studies and professional employment

remains high (as it does for students of archaeology globally), it seems to be declining. An increasing number of junior archaeologists engage in fieldwork and publication, are granted responsibility as primary investigators on government permits, and--most importantly—are more frequently employed, for example by the Georgia National Museum. It is worth noting explicitly the funnel of this narrative of knowledge production: moving from the South Caucasus, to the countries of Armenia and Georgia, to the employment practices of a single institution. This illustrates another relevant condition of research in the area, which in experience can often be practically limited to a very small region.

As for zooarchaeology, the party traditionally responsible for recording and analyzing faunal material in the South Caucasus has been the paleozoologist. This has had the effect of reliable registration of the presence and absence of species occurring in older archaeological sites, but a lack of the kind of detail that an anthropological zooarchaeologist generally relies upon. The discipline of zooarchaeology has grown, and the importation by international teams of specialists from Australia, France, Germany, Italy, and the US has meant a growing trove of faunal material and increasingly detailed records. However, a diversity of professional training has meant that many of the resulting datasets are to some degree incompatible. Further, a tendency for zooarchaeologists to be found among graduate students rather than funded as highly skilled specialists, has meant that participation is often fleeting.

Methods

Two alternative methods of exploring the literature are systematic. One takes a genealogical approach, beginning with the "forebearers" of what was then called Transcaucasian archaeology, with a focus on faunal remains from the Bronze Age (method adapted from Garfield 2002). This approach follows these scholars forward through the literature, seeking the researchers by whom, and alongside whom, they are referenced. Two approaches are taken to find these references: primary references were found via a full-text search for in-text citation and secondary citations used these primary references to search for identifiers in the metadata. Corpus 1 is the resulting publication list (the candidate population).

The second approach could be called archaeological. A search of the literature for papers similar to the dissertation produces the most visible surface of zooarchaeology of the Bronze Age South Caucasus. These publications are the latest structures built on a mound of thought, research, and labor. Corpus 2 was constructed by following their references backwards, in two steps (mirroring the steps forward of Corpus 1). The document set assembled by this approach is Corpus 2.

Finally, the third corpus is composed of the bibliography which was submitted with the 2019 draft of the author's doctoral dissertation (in progress), *The Herd, the Hearth, and the Hunt: Human-Animal Relationships in the Bronze Age South Caucasus*. The discovery period of this dissertation could not be properly called systematic. Disciplinary training in anthropological archaeology is shaped by the constellation of mentors, courses of undergraduate and graduate study, and

professional networks that a junior scholar builds in the field (and by serendipity). This can be considered a *discipline-network* approach.

From corpora 1 and 2, the unique authors of publications with more than one citation within their corpus are extracted. These authors are then situated in the citation and collaboration networks, to reconstruct temporal, spatial, and interpersonal conditions of knowledge production. By putting these two approaches in conversation, it should be possible to discover the places the standard approach did not lead and to identify divergent tendencies in the field as it appears today.

The results of these three approaches are then compared. First the individual researchers are extracted from each corpus. This step is taken to reduce the impact of inconsistent coverage of output in multiple languages.

Results

Corpus 1

Some of the founding scholars of the study of the Bronze Age in the South Caucasus (putting a somewhat artificial upper boundary of 1950), are Jacques de Morgan (1889), Nikolai Marr (1894, 1922), Iessen (1935), Boris Kuftin (1941, 1944, 1949), and Piotrovskii (1944, 1949). For zooarchaeology in Georgia and Armenia, Oleg Bendukidze and Nina H. Manaserian are the major early figures, respectively.

A full-text search for the combination of each author's name and the year of publication given above, within two-word proximity, in the full text of all publications in the Dimensions publication dataset published before 2020 resulted in 309 unique publications. There were no publications found for the N. Manaserian who was the scholar responsible for early Armenian zooarchaeology, though there were several papers found by her daughter, N. Manaserian (or Manaseryan), which were added to Corpus 2. By adding the publications which have cited those 309 publications, Corpus 1 is composed of in a total of 1380 unique publications.

Corpus 2

A search in the titles and abstracts of the Dimensions publication dataset for ("South Caucasus" [within two-word proximity]) OR ("Kura Araxes") OR ((Caucas*) AND (Armenia OR Georgia OR Azerbaijan)) OR (Transcauc*)) AND ("Bronze Age") AND (zoomorph* OR (((archaeozoolog* OR zooarchaeolog*) OR (arch* AND (fauna* OR animal*))))) produced 22 results from the Dimensions API, each of which was published from 2015-2025. The publications authored by N. Manaserian and N. Manaseryan in the Dimensions dataset were added to these, as were the 500 documents produced by a similarity search using the abstract of the dissertation. This resulted in a total of 531 publications, and when the references listed in each of those publications were added to the corpus, Corpus 2 is composed of 3769 unique publications.

Corpus 3

The third corpus consists of the items of the bibliography produced through what I have termed the discipline-network approach. The process of compiling this

literature began with the composition of a reading list for what Cornell University terms the "B Exam", which is a precursor to the dissertation proposal, and completion of which confers a Master's degree. The reading list began with familiar texts assigned in introductory coursework (introductions to archaeology theory and methods, the region of the South Caucasus, landscape and mortuary archaeology, and social zooarchaeology). Additions to the list were identified using the references sections of these texts, the suggestions of the doctoral committee (Adam T. Smith, Lori Khatchadourian, and Nerissa Russell), and through conversation with local archaeologists in Armenia and Georgia during fieldwork performed in these countries. There were 170 referenced publications by 146 unique authors (only including the first author of publications with 3 or more authors).

The last names of researchers who authored the publications in Corpus 3 joined with the authors of the subset of the Corpus 1 and Corpus 2 published before 2020, which had more than two references from either corpus 1 or 2, produced a list of 1227 distinct researchers. The overlap of these researchers by corpus can be seen in Figure 1.

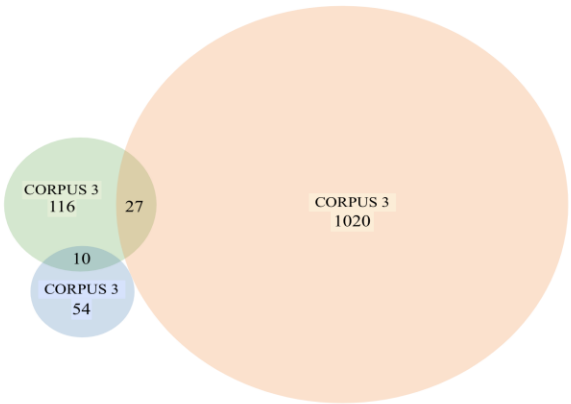

Figure 1. Unique authors per corpus.

Discussion

It is too easy for scientometricians to sidestep the limitations of our datasets and approaches to the humanities and (some of the) social sciences. Focusing on the fields which are best suited to systematic analyses because of the completeness of coverage and the homogeneity and regulation of research design and output can lead to an inaccurate sense of the reliability, validity, and superiority of such approaches. The importance of systematic review as a collection of all relevant literature on a subject is well established, but it is equally true for archaeological studies that a missing reference makes the difference between competent and insufficient research. It becomes essential, then, to consider how to address a subject of research for which available datasets are incomplete, whether due to missing languages, "non-traditional" research outputs, or divergent practices of digitization.

Conclusions

The research thus far shows a surprising variation in the results of each approach. The isolated nature of the second corpus suggests that either Corpus 1 and 2 require a tertiary level of citation/reference (that is, the references to the secondary citations of Corpus 1 and the citations of the secondary references of Corpus 2), or that some additional constraint by subject should be applied to Corpus 2. After refining the approach, the next step of research (inspired by Leydesdorff, 2010) will involve looking at trends in concepts over time, the geographic distribution of citing and cited authors, and trends in the academic age of the authors citing and cited in each corpus.

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