Documenting archaeological knowledge construction as information practices

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Abstract

Archaeology is a complex and communal undertaking that brings together people with varied backgrounds, who mobilize a wide range of tools and expert knowledge to assemble the archaeological record. In recognizing objects of interest and characterizing their significance through encoded disciplinary language (i.e. through data construction and other forms of scholarly communication), we situate our tacit, local experiences within an archaeological epistemic culture, or common modes of reasoning. Communication among archaeologists is therefore considered as a process of enculturation, whereby a shared understanding of the pragmatic conditions and expectations that underlie a record's construction facilitates its continued use by others.

This paper presents the preliminary results from my doctoral research, which is an attempt to better understand this archaeological epistemic culture, and to develop information infrastructures that facilitate the interoperability of archaeological data across research contexts. By observing archaeologists as they work, which includes affixing GoPro action cameras to their foreheads in order to obtain first-person perspectives, the physical, cognitive and communicative processes that comprise common fieldwork practices are formally identified and related. These observations are integrated with interviews and analysis of recording practices in order to better understand individuals' affective roles within their socio-technical research environments, as well as the communicative processes (i.e. documentation, representation and mediation) that enable research to be distributed among archaeologists and across various settings. In sum, I trace the relationships among archaeologists, their tools, the ideas they draw from, and the archaeological record itself, as knowledge is constructed under realistic and social conditions.

Introduction

The push towards reflexive archaeological practice has led to rich discussions concerning the ways in which archaeological knowledge is constructed and presented within contemporary research environments. The seemingly stable and consistent values stored in a database, spreadsheet, photograph or schematic are generally recognized to be more than just static lumps of bits on a hard drive; they actually represent dynamic stories of archaeological practice that occurs within uneven social landscapes, populated by people holding varied perspectives, as well as objects and ideas that undeniably and inescapably shape what we know, and how we know, about the past (Lucas 2012; Wylie 2017). Understanding how this occurs, however, requires a shift in perspective that focuses an analytical gaze back upon the archaeological process.

The practical ways in which archaeologists navigate such epistemically-complex disciplinary landscape in order to say authoritative and meaningful things about the past can be analyzed in a variety of ways, ranging from informal discussion of generalized disciplinary tendencies, to highly methodological analysis of specific archaeological practices; however closer examination of what archaeologists actually do 'close to the metal' – that is to say, what they actually do in their day to day work, as opposed to what they think or say they do – may more effectively capture the intricacies and taken for granted tendencies that fade into the background, which encompass collectively held assumptions and norms. Such investigations that highlight the needs and outcomes of archaeological practices from various stakeholder perspectives may better inform the development of more effective information infrastructures – the set of organizational practices, techniques and social norms – that support archaeological research in practice.

This paper examines a series of specific episodes of archaeological fieldwork through activity theory, situated cognition, and distributed cognition approaches. Each has its own benefits and limitations, which will be discussed in general terms and with regards to their potential application examining archaeological research practices.

Framing Scholarly Practice

This work draws from sociology of scientific knowledge by examining scholarly research as cultural practice, or ways of understanding the world through a complex series of physical and conceptual interactions between humans and their objects of interest (Knorr-Cetina 1999; Pickering 1992a). This is accomplished by othering scholars and examining them as part of professional communities, whose members share common material engagements, modes of communication, organizational structures and conceptual norms. This makes it possible to document and analyze scholarly work as a series of improvised, continuous and community-driven practices, involving interactions among people, objects and ideas (i.e. socio-technical interactions). However, various

methodological frameworks, including activity theory, situated cognition and distributed cognition, may be applied to examine research practices in different ways. Each of these approaches yield different kinds of insights, and it is important to consider their affordances and limitations when conducting methodologically rigorous reflexive research about archaeological practice and knowledge production.

Activity Theory

Activity theory is a theoretical framework that breaks down and carefully considers the relations that comprise goal-directed practical activities. Activities are comprised of subject-object relations, whereby objectives direct a series of actions conducted by subjects, who mobilize various mediating artefacts in order to achieve their goals (Leonťev 1974: 22-23). Mediating artefacts might include physical and conceptual tools such as instruments, signs, language and machines, which are strategically selected to complete the task at hand.

Activities are not isolated systems; they occur as pragmatic moments, embedded in the contemporary world (Leonťev 1974: 14-16). Activities might also be operationalized in ways that render them as common-sense ways or mundane acts, which fade into the background or become taken for granted (Nardi 1996: 37-38). Moreover, as objects change, so does the fundamental nature of the activity, however objects held in the minds of subjects are generally thought to remain somewhat stable prior to such substantial alterations so that they might be grappled with (Nardi 1996: 37-38).

Activity theory is commonly applied in knowledge, work and project management contexts, as well as in planning, design and digital curation. It is particularly useful in contexts wherein goals are clearly articulated, either as directed by a managerial position, or as otherwise agreed upon by well-aligned team members, who are assumed to be proficient in their well-defined and essential roles (Engeström 2000: 964). Activities may intersect and overlap across various domains of work in ways that contribute to regular decision-making strategies within complex organizations, and even to the emergence of innovative knowledge (Choo 2002; Engeström 2000: 972).

Situated Cognition

Situated cognition is a theoretical framework that examines the improvised, contingent and embodied experiences of human activity, or as Nardi (1996: 36) more aptly states, "the way activity grows out of the particularities of a given situation". It was formulated in response to a perceived over-reliance on cognitive approaches to supposedly rational problem solving, by raising consideration of the embodied and experienced situations in which actions are actually performed (Lave 1988; Suchman 1987). However it is still a rather behaviouristic approach that emphasizes responsiveness to the environment, while diminishing attention towards articulations or explanations posed by observed subjects. Explanations of activities are considered to be formulated post hoc, as justifications for acting a certain way in a given situation, rather than as signs of preemptive strategic planning (Nardi 1996: 40). Activities are observed closely from an outsider's perspective, and then narrated in such a way that ascribes meaning at least partially imposed by the observer.

It is common to see situated cognition approaches being used to describe everyday activities, as ordinary people navigate the worlds that they inhabit. It is also closely related to Lave & Wenger's (1991) theory of situated learning (also commonly referred to as a 'communities of practice' approach), whereby individuals acquire professional skills in relation to the social environments in which they are situated. Moreover, it has been used to evaluate strategic non-compliance with predefined protocols, or the unintended uses of objects and systems in ways that meet the needs of specific situation that have not necessarily been accounted for in their original design (cf. Garfinkel 1967; Suchman 1987; Suchman, Trigg & Blomberg 2002).

Distributed Cognition

Distributed cognition is a theoretical framework that highlights the synergistic relationships among people and things who operate within goal-oriented systems. Each component of a system is considered to contribute to a broader system-wide effort in some way, and only through their interlocking convergence can they accomplish something greater than the sum of their parts (Hutchins 1995). Generally,

this approach assumes that all of a system's components are already in place and ready to be used. It is therefore oriented towards complete or closed systems, viewed with broad perspective (Nardi 1996: 42-43).

Distributed cognition is commonly applied to assess and troubleshoot human engagement with dynamic and complex machinery used in industrial or military settings. As an approach dealing with cognition in action, there is also emphasis on communicative aspects of action (Nardi 1996: 39); proponents have therefore developed useful methodological frameworks for documenting and analyzing conversations, combined gesture and speech, and the subtleties of professional communication and language (cf. Goodwin 1994; Hutchins 1995, 2010).

Framing an Adequate Comparison

In order to evaluate the suitability of activity theory, situated cognition and distributed cognition for providing a better understanding of socio-technical aspects of the archaeological process, the following concerns should be considered: how are the agency and relations pertaining to people and objects understood? How is the sociality of work accounted for, especially with regards to people's roles within project hierarchies, and the capability for people to learn and grow? How are meanings thought to be negotiated, communicated and modified over time, at personal and community levels of understanding? How might observations be conducted to examine work being done across different research environments, and as part of projects that are simultaneously unique and generalizable?

Case Study

These methodological approaches have been briefly applied to examine various related episodes of archaeological work conducted at an excavation of a prehistoric site in southern Europe. This project is considered to be representative of a broader class of archaeological research projects in various ways. Like many other archaeological projects, its research team composition and governance structure follows a common model – it comprises a director who coordinates the project, various specialists who are called in by the director to offer their expert input in the interpretation of finds, a series of trench supervisors who lead excavation and coordinate data
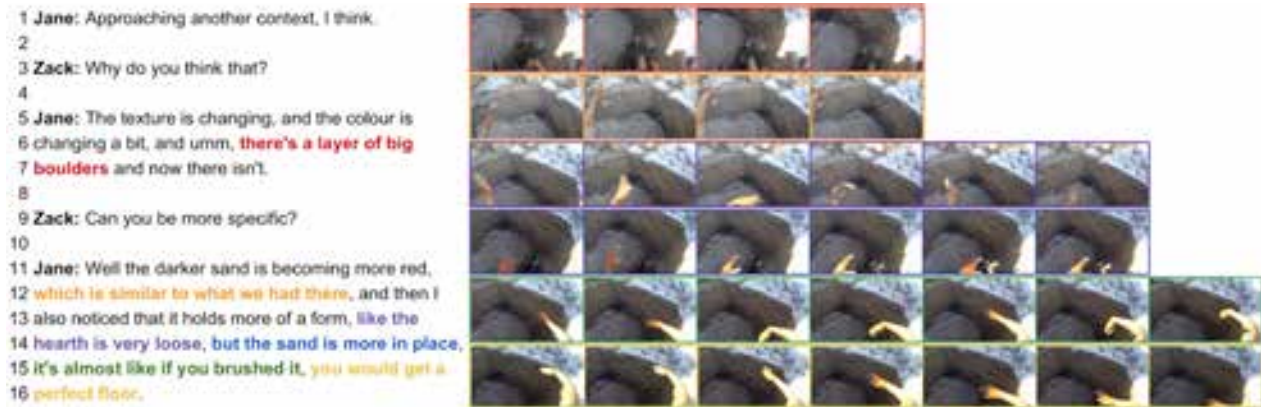
1 **Jane:** Approaching another context, I think.
2
3 **Zack:** Why do you think that?
4
5 **Jane:** The texture is changing, and the colour is
6 changing a bit, and umm, there's a layer of big
7 boulders and now there isn't.
8
9 **Zack:** Can you be more specific?
10
11 **Jane:** Well the darker sand is becoming more red,
12 which is similar to what we had there, and then I
13 also noticed that it holds more of a form, like the
14 hearth is very loose, but the sand is more in place,
15 it's almost like if you brushed it, you would get a
16 perfect floor.

Figure 1. Explanation of a potential context change using gesture and speech.

collection, and excavators who are usually less experienced students who operate under the guidance of their assigned trench supervisors. It also relies extensively on archaeological surface surveys and assessments of the landscape to inform excavation strategies and guide interpretations of finds. Digital tools and methods are also being increasingly implemented, as informed by examples of their similar use elsewhere, and in a way that reinforces their subsequent adoption by others. Like any other archaeological project, it addresses common underlying research questions, and constantly compares its findings with similar work occurring in the vicinity. Moreover, it is reliant on and engaged with local communities, who support the research by agreeing to have their lands excavated, while also providing housing, food and other amenities to the mostly foreign research team.

This project thus serves as a salient case study that enables documentation of the pragmatic and multifaceted ways in which archaeologists reason and work their way through rather mundane activities that are commonly undertaken in similar research contexts. Due to the inherent power imbalances of academia, and of field-based research in particular, participants identities, as well as the identity of the archaeological project as a whole, have been anonymized in order to reduce potential risk to participants' professional reputations.

Methods

Multiple vectors of data collection were implemented. Archaeologists were recorded as they worked using GoPro action cameras, which were sometimes strapped to participants' heads so first person perspectives could be obtained. Detailed notes were also kept of observations in the trenches, at the dig house, in the museum, and throughout the season in various settings. Interviews were held with excavation staff, as well as with finds specialists, and the project's director, to better understand their situated perspectives regarding salient aspects of their work and regarding the ways in which they reason. These are more retrospective in nature, and differ from more casual field interviews, which tend to reflect thoughts on practices that were being undertaken at the moment. Lastly, documents produced and used by members of the project were examined, and are broadly defined to include recording sheets, reports, diagrams, finds bags, tags, scrap notes, descriptive monologues, stories and demonstrations. Specific attention has been paid to trace how ideas are transcribed and rendered across various kinds of media, and how this reflects the project's, and indeed the discipline's, dynamic information landscape.

All of this contributes towards the development of a large and integrated dataset that is then qualitatively analyzed in order to highlight the cognitive and communicative processes involved in the construction and curation of archaeological data. This entails coding segments of video, audio and text using language that serves to bridge the gap between the archaeological practices observed and the theoretical frameworks applied to explore them as epistemic activities and interfaces.

Episodes of Archaeological Practice

A series of related episodes have been selected from observations conducted during the summer of 2017. A brief overview of these episodes is provided before comparing how different methodological approaches may be applied to analyze them. All names presented here are pseudonyms.

The first episode is focused on a conversation between myself and Jane, a novice but also promising excavator. In this brief conversation, which occurred as I was observing her excavate a sondage, Jane explains how she identifies and differentiates a new context that she is coming down on.
One interesting aspect of this exchange is the series of gestures that she pairs with speech, which help convey what she means to say (Figure 1). She kicks the boulders as she refers to them, literally points out relations to previous experiences, and describes certain aspects of the soil by miming the ways that she would interact with them. Jane's combination of gestures and speech reveal the ways in which she semantically relates objects of interest to each other and to her own actions.

A similar conversation was observed between Jane and her trench supervisor, Basil, upon his return to the trench (Figure 2). Basil also happens to be the project's director, and often leaves Jane to work independently while he performs other tasks that are necessary to keep the project running smoothly.
To quickly summarize the entire exchange, Jane explains her interpretation of the soil to Basil, and after he evaluates Jane's account more closely, he provides her with instructions for how to proceed.

An interview held with Jane also provided insight regarding how she situates herself in relation to others, and how she understands her experiences as part of structured and rational system of knowledge (Figure 3).

Finally, handwritten observations were made of the practices involved in drawing trench sections at the very end of the season (Figure 4).

Observations were also made of section drawing at other trenches, though only the notes pertaining to the activities in Jane's trench are included here. Max is an extremely experienced excavator and is highly skilled at drawing sections. Carly is another skilled archaeologist who supervises a series of trenches nearby, but has no experience working in the area where Jane's trench is situated.
Analyzing Archaeological Practice

From an activity theoretic perspective, Jane's objectives as an excavator of a trench in this geo-archaeologically focused project are to identify and characterize the various sediments she encounters as she digs her way down to bedrock. She uses physical and conceptual tools in order to accomplish this task. Particularly notable is the geoarchaeological conceptual framework used to characterize and describe the site's various sediments, which was introduced to the project by Alf, who is a geoarchaeological specialist and the assistant field director, and whose ongoing dissertation work, in general terms, compares the geoarchaeology of this site to that of others in the region. The specialized conceptual framework is being implemented in order to systematically characterize the sediment according to professional geoarchaeological standards.

After observing Jane excavate the trench, various activities were delimited and modelled, in a similar manner as Engeström's (2000) application an activity theoretic approach to model various aspects of patient care in a children's hospital in Helsinki, Finland. This approach reduces archaeological practices into goal-directed activities, which are then evaluated as intersections of underlying aspects of work that become entangled when focusing attention upon a particular object. For example, the physical excavation of a context entails an excavator using various physical tools to move the material pertaining to the currently opened context out of the trench (Figure 5). Attention is focused on the currently opened context, with the goal of collecting all of the material in a discrete and tidy manner. A second act of identifying new sediments when they are encountered leverages physical and conceptual tools that help compare sediments within the trench and across the site (Figure 6). The division of labour establishes that trenches are the domains of their trench supervisors, and that it is the trench supervisors who are responsible for making decisive calls on how the stratigraphy is identified and organized. The use of a common geoarchaeological conceptual framework enables the supervisors to share a common point of view, however their conceptions and comparisons tend to be expressed using informal language and through indirect references. A third activity, the filling out

1 **Jane** : So, this is like still kind of a dark, dark
2 brown, going into the sand, but it's like really
3 tough, like hard to dig through, kind of. So I think
4 maybe it's just context [?]. *((gesturing towards*
5 *other side of the trench))* And then this is like really
6 light grey, *((bobs hand up and down to emphasize*
7 *these last three words))* and I thought it was just
8 cuz it had just dried out, and I hadn't done this
9 kind of [fill], but it's also really hard to dig, and
10 like a really light grey, so I don't know if it's just
11 remnants of this part, or what...
12
13 *((Basil gets in the trench to take a closer look))*
14
15 **Jane:** Or like maybe this is like, would it be
16 possible that that's like an older hearth, like the
17 other one that was leached out?
18
19 **Basil:** Yeah, hmm. So the colour here is the same
20 as what you were digging, but the consistency
21 has changed?
22
23 **Jane:** Yeah.
24
25 **Basil:** I would clean up, maybe just straighten
26 that section a bit, [
27   [**Jane:** yeah
28 just to the depth that you started at for this
29 context, [
30   [**Jane:** yeah
31 and then we'll clean up and carry on with... you
32 know we can just write in the text that, you know,
33 these are the differences, [
34   [**Jane:** yeah
35 but you know what, after we start to dig it it
36 might change back to something much more
37 familiar, [
38   [**Jane:** yea
39 and we can just say oh, it's like some kind of
40 differential lens of material within it, [
41   [Jane: right
42 yea, or quite possibly a continuation of what we
43 had before... [
44   [**Jane:** okay
45
46 **Jane:** Okay, so just clean up the walls, and then
47 keep going, okay.
48
49 **Basil:** Yeah, but we can photograph, change
50 numbers
51
52 **Jane:** Oh, okay.
53
54 **Basil:** We'll treat it as something different, you
55 know we can write in the notes that there is a
56 very good chance that it's still the same stuff, but
57 the consistency changed [
58   [**Jane:** right
59 so, just to be careful.

Figure 2. A conversation between an excavator and her trench supervisor regarding a potential context change.

1 **Zack:** Can you tell me about challenges in
2 comprehending something that you eventually
3 learned, especially maybe at the beginning?
4
5 **Jane:** ... It's always hard to train your eye to see
6 certain things, like sometimes Alfred would like
7 take out a handful of sand and go like 'do you see
8 the red flakes?' and I would be like 'no', or even like,
9 pointing out stratigraphy, like see how this changes
10 to this level, and it just kind of, **training your eye**
11 **to see what they're seeing** is, sounds like an easy
12 thing but it's actually hard to like, kind of, **pick out**
13 **things that they want you to pick out**. And I think
14 like now it's easier, like, 'oh, see how that's
15 transitioning', or like, umm, even just like
16 comparing peoples' trenches and like the contexts
17 they're in, it's easier now but at the start it was like
18 **'it looks the same to me'**, or like **'I don't spot**
19 **what you're spotting'**, you know? And it's just a
20 way of looking at things that I think that's the
21 hardest part for me.
22
23 **Zack:** Do you know how that developed?
24
25 **Jane:** I think just like **repetitive, like every day,**
26 **looking at stuff**, I think is like, just a good way of
27 learning. I don't know if there's something specific
28 but... and just hearing from like, **hearing Alfred**
29 **pointing it out, hearing Basil pointing it out,**
30 **hearing different supervisors pointing it out**, it
31 was just different ways of explaining it or showing
32 it to you that it starts to kind of, like, produce a form
33 of knowledge.

Figure 3. Segment of an interview, wherein Jane explains how she learned to characterize sediments in a geoarchaeological manner.

of recording sheets, entails the formal description of excavated contexts in a more structured manner (Figure 7). Trench supervisors use formal language and standardized schema to describe the context in ways that facilitate comparison of contexts across the site; these schematic protocols are implemented as part of broader efforts to curate the data throughout the continuum of the project.

Others activity models might be derived for a wide array of related activities such as data entry into a digital database, the formulation of database queries, various aspects of finds processing and analysis, various actions involved in the physical storage and organization of finds, among other archaeological practices.

This approach, based upon direct observation of

July 4th 2017

I will now observe Max and Carly draw the sections for trench 028. No one else is here, and Max expressed some confusion regarding what is going on in this trench. Moreover, Basil can not find the paperwork for 028, he is on top of the hill at either 033 or 034, and Jane is resting back at the dighouse. So it should be interesting to see how Max's drawing pans out with Basil's expectations.

Carly on the big boulder in the southeast corner. Max on the north side, with graph paper, taped down to his clipboard with bandaids. Carly calls out numbers to him as he marks them down. They called for my help for a moment because it was too deep for Carly. Upon hearing the elevation of the base at 1.5m along the edge, Max laughed and said it is was too deep, and that he would need another sheet of paper. This wind is going to make that horrendously difficult. So they reprioritized, and limited their scope to the upper part that would fit on the page.

July 5th 2017

Jane seems very comfortable in her trench, much more than Carly yesterday. Max is able to communicate with her, ask her questions. She also refers to her sediment description on her contexts sheets so that Max can annotate the textures more appropriately. He asked whether what they just did was the hearth and she said "no, it's the black-brown stuff above the hearth". He then wrote something like that down on his drawing. He also showed her the connected dots and asked her "does it look something like that?" and she answered that it does.

Figure 4. Observational notes regarding the practices involved in drawing trench sections.

work in action, dissects the various aspects of archaeological practices in order to understand how they are the product of a series of interacting entities and forces. It may be particularly useful for modelling common or mundane activities that are taken for granted due to their ubiquity. This might be applied to document 'recipes' for common archaeological practices (cf. Dallas 2015: 195), however such generalized formulae may not adequately account for their inconsistent implementation over time or across various local settings.

Situated cognition is an alternative approach that may be helpful for obtaining a realistic account of how skills are applied over time in the field, as excavators leverage their experiences to act on a given situation presented to them. For instance, as she incrementally excavates throughout the season, Jane develops a feel for the textures of the soils within her trench and in others where she has worked, which contributes towards her ability to characterize different kinds of sediments present across the site in a professionally acceptable manner. Jane recognized this herself during her retrospective interview, when she revealed that she initially found it difficult to "train her eye to see what they're seeing", and "they" seems to refer to more senior and specialized archaeologists, including Basil and Alf (Figure 3: lines 5-19). Jane also indicated that her continuous and active engagement with the sediments in the field, supported by the guidance of more established supervisors, contributed to her ability to do this work independently (Figure 3: lines 28-33). Additionally, her efforts to properly use controlled language and scales of measurement laid out in the geoarchaeological conceptual framework reflects such a commitment to aligning her view with that of others on the project, and within the broader disciplinary community as a whole.

Moreover, the ways in which Jane draws out conceptual entities based on her prior knowledge and experiences, and her presumptions regarding what is to be done with her observations, highlight how the object comes into view as part of a broader system of curated knowledge. This is a clear example of legitimate peripheral participation, or situated learning, whereby her gradual establishment as a member of the professional community will depend on her ability to be cognizant in a way that runs parallel with the community's standards, and she works her way from an outsider to an insider through continuous and practical engagement along the periphery of the archaeological community (cf. Darvill 2009; Goodwin 2010; Lave & Wenger 1991). This is well-illustrated in Jane's conversation with Basil, wherein she explained her interpretation of the soil while her supervisor responded with tentative agreement (Figure 2: lines 31-
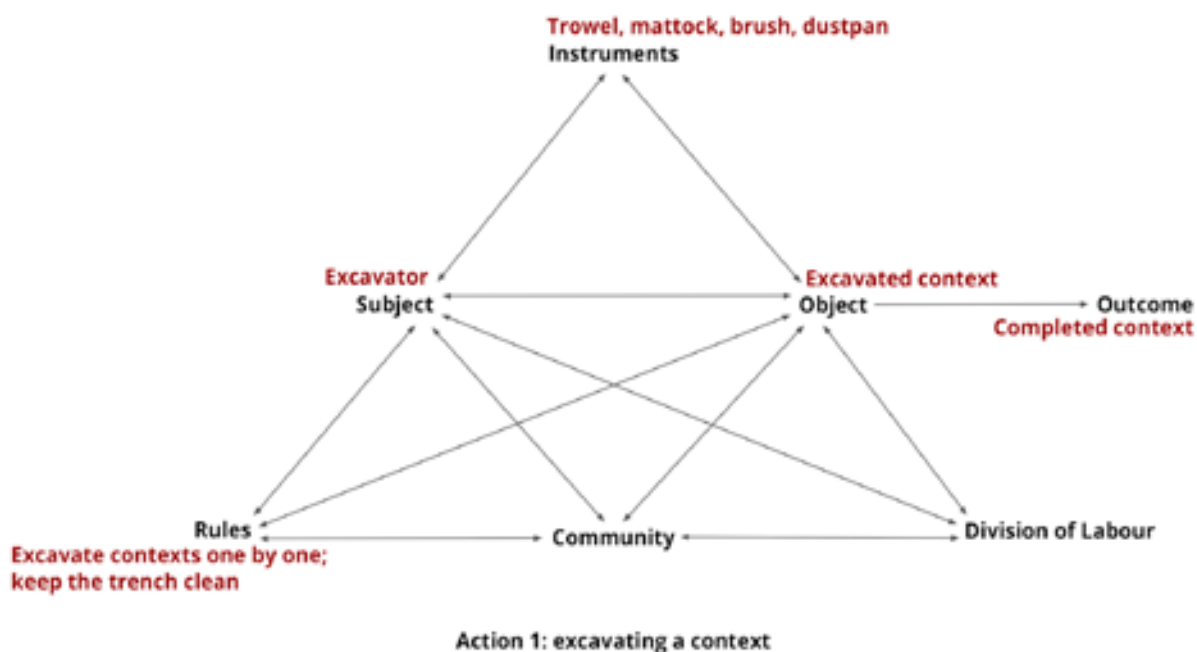
Figure 5. Activity model pertaining to the act of excavating a context
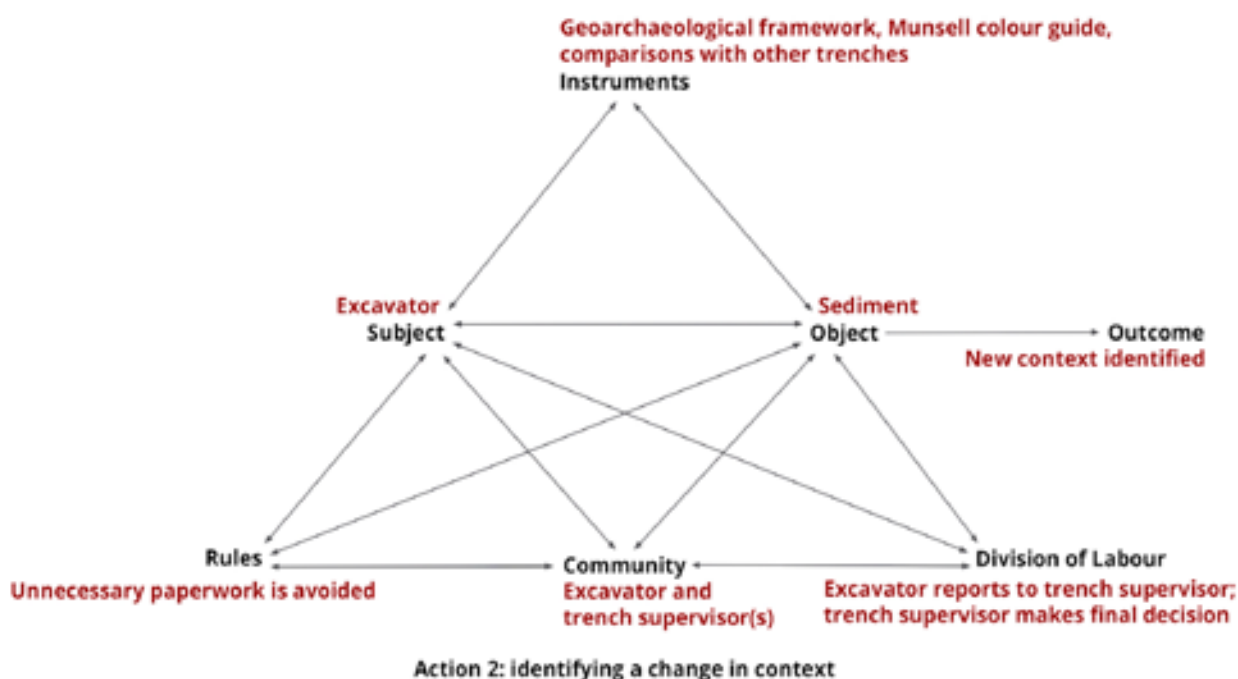

Figure 6. Activity model pertaining to the act of identifying a change in context.

45, 54-59). Basil's subtle gestures that indicate where his tentativity lies, and Jane's respective acknowledgements served as signals that helped keep Jane's interpretations on track (Figure 2: lines 25-44).

Jane is thus involved in simultaneous and dialectic processes of upstreaming, whereby objects come into view as informed by what they should look like, and downstreaming, whereby objects are described and represented for further use down the line of the archaeological process (Dallas 2015: 190-191). As an active excavator in a specific and unique situation, Jane uses physical and conceptual tools to ensure that what she interprets is true to the things she observes, and also imposes order upon
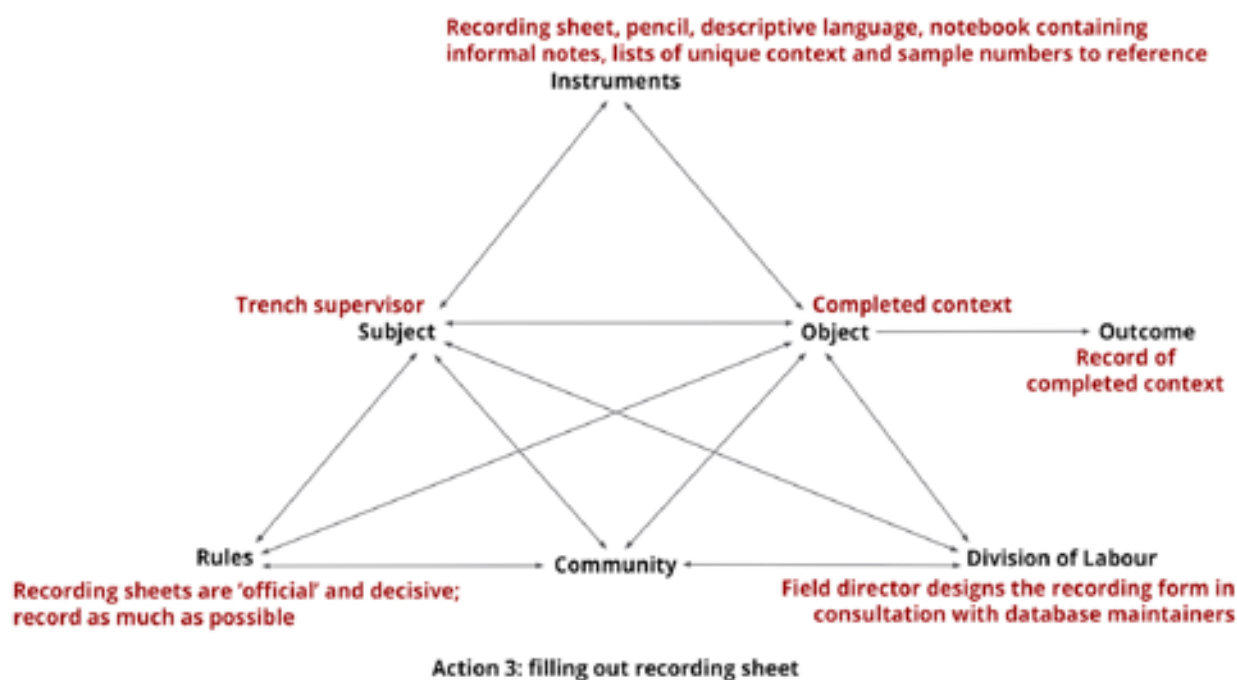
Figure 7. Activity model pertaining to the act of filling out a context recording sheet.

these objects so that her direct observations might be communicated and used in secondary research environments.

Jane's work is therefore framed as experienced, embodied and responsive to local circumstances as beheld by her unique perspective. However, as Goodwin (2010) highlighted in his examination of archaeological learning in the field, certain tools such as the Munsell colour chart, help individuals translate their own unique experiences to a series of communal references points. This example of professional training, where students are taught how to see what their supervisors are seeing, can be conceptualized in terms of a situated learning experience, similarly to the earlier examination of the conversation between Jane and Basil. However, this scene can also be examined using a distributed cognition framework, which highlights the intersections among human and non-human agents, which are integrated to form stable communicative links. In other words, distributed cognition may be applied to examine how human and non-human agents are mobilized as parts of coordinated efforts to produce knowledge that could not have been derived from any single individual working in isolation.

Archaeological projects may thus be conceptual-

ized as assemblages of people, things and ideas used to support individual efforts as well as the mutual goals of the project as a whole. Distributed cognition is therefore useful for examining the coordination of archaeological practices that make up broader systems of work. This requires the observer to consider aspects of archaeological practices that extend beyond the here-and-now, such as projections, transcriptions, imaginations or hypotheses of potential outcomes that tie in with further work being done over time. In this sense, archaeological practices may be examined as contributions to carefully planned methodological protocols or research programs, wherein communication of ideas and observations is key to their successful implementation.

Section drawings constitute good examples of this. Section drawing essentially entails transposing various points that outline an excavated context, which are observed on the vertical face of the trench, onto a sheet of paper, aided by the use of grid systems that serve to maintain the proportional distance between plotted points. The result is a proportionally-intact representation of the polygons observed on the trench's vertical surface. In practice, this is accomplished by assembling a communication system comprising a series of physical and
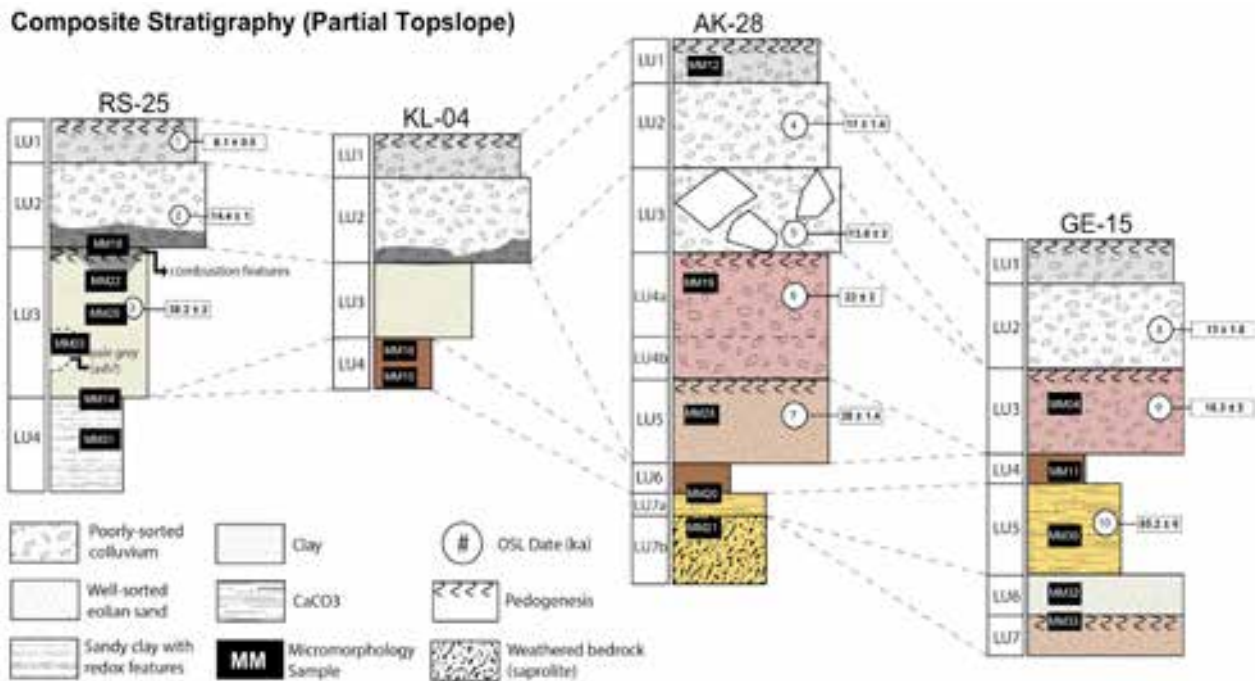
Figure 8. Replica of a document that synthesizes data collected using various kinds of methods and across various segments of the project.

conceptual tools – such as string, plumbobs, pencils, notches marked along a tape measure, graph paper and other ad hoc implements – so that a stable transcription of the trench can be transported back to the dig house where it stands in as a record of the trench itself. Although the tangle of tools that are used to construct the representation is unstable and susceptible to disturbance, it includes a fixed reference point that ensures that the plotted information is spatially grounded. The locations from which dating samples were taken, which have been shot in using a total station, are thus plotted in accordingly afterwards. Moreover, the geoarchaeological characteristics of each context are encoded for each polygon. The relative depths and age ranges pertaining to dating samples from various trenches are combined with an integrated representation of the geoarchaeology of the site as a whole in order to determine the relative ages of unsampled trenches and to plan for further excavation and sampling based upon such syntheses (Figure 8).

It thus becomes apparent how Jane's efforts to delimit discrete contexts and adopt a geoarchaeological conceptual framework as she does so are brought to bear upon broader workflows. In this specific case, the hierarchical nature of the project's organizational structure enables people's work to be orchestrated

according to carefully planned research protocols designed by the project's director.

Conclusion

Systematic inquiries regarding the practical implementation of archaeological practices can provide lots of insight regarding the underlying epistemic commitments underpinning common research activities. However, it is important to be self-aware and purposeful when conducting such meta-disciplinary reviews. Different methodological outlooks require the use of different kinds of data, and may identify different loci of agency, account for social contexts in different ways, and exhibit varying capabilities to examine continuity of archaeological practices over time and across localized circumstances.

The methodological frameworks discussed here have been critically evaluated over the past several decades in efforts to better understand the impacts and implications of their use to examine work – and scholarly research practices in particular – in action (Haraway 1988; Law 2004; Nardi 1996; Pickering 1992b). This paper is meant as a brief primer of three such approaches, including a comparison of how they might be implemented to critically examine archaeo-

logical practices as processes of meaning-making. A more in depth review of that literature is advised to gain a greater understanding of each methodological framework's epistemic sensitivities and limitations, prior to initiating grounded research regarding the enaction of archaeological practices.

Such work is important moving forward due to the epistemic challenges that lie ahead as open scholarship increasingly enables archaeological authority to be questioned and practical expertise to be trivialized (cf. Morgan and Pallascio 2015; Ratto 2012; Richardson & Lindgren 2017). The heterogeneity of scholarly practice and of the different kinds of data that inform various scholarly communities in different ways is important to highlight in a professional context that favours highly technical, reductive and immutable conceptions of what archaeology and archaeological data is and should be. This is particularly important with regards to contemporary pressures to share the products of archaeological research, namely research data, openly and publicly, which exhibits genuine virtues but that also warrants critical reflection regarding the ways in which archaeological data is presented and framed. Archaeological practices and the products of archaeological research exhibit unique idiosyncrasies that may not be adequately accounted for under the curatorial frameworks that currently exist. If we are to consider data sharing as an integral part of archaeological research, it must extend from contemporary practices and relate to practical needs (Huggett 2012; Huvila 2018). Therefore, archaeological research, in all its stages and forms, needs to be considered as part of a continuous and richly textured curatorial process involving various tools, concepts, experiences and communication strategies, which can be reflected upon in various ways (Dallas 2015; Dallas 2016; Huggett 2015).

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