

Communities of Practice Theory in Egyptian
Archaeology: A Case Study for Its Application
with Old Kingdom Sealings and Seal Impressions
from Giza

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Abstract

Theoretical approaches for reconstructing social dynamics in ancient Egypt are increasingly being employed by Egyptologists. The motives behind this development are the enlightenment of certain issues that traditional archaeological methods and methodologies cannot provide. One such theory that has not been tested in this context, but has great potential, is *communities of practice*. The *communities of practice* methodology includes concepts that can examine how individuals interact with other people, their objects and their environment to learn and produce a practice (as understood by Bourdieu and Giddens). It has considerable potential for illuminating the world of ancient Egypt (as well as other ancient civilizations).

Drawing on two case studies from the Old Kingdom (ca. 2613-2181 bce), this thesis tests a hypothesis that *communities of practice* theory can be effectively used to illuminate processes of learning, practice, relationship-building and continuity as they relate to administrative sealing. The data for my first case study derives from seal impressions and sealings excavated at Pottery Mound in Heit el-Ghurob, Giza as a means to question whether communities of practice offers ways for understanding small scale sealing practice and daily interactions. The data for my second case study originates from seal impressions and sealings excavated at other sites in Heit el-Ghurob, Gebel el-Quibli, Khentkawes Town and Silo Building Complex on the Giza Plateau. This case study explores how knowledge networks and shared sealing practice work at larger scales. These datasets are analyzed with the *communities of practice methodology*, as a means to gain new insights into ancient sealing practice and administration.

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Abbreviations

AERA – Ancient Egypt Research Associates

ACER – Australian Centre for Egyptology Reports

ARCE – American Research Center in Egypt

ASAE – Annales du Service des Antiquités de l'Égypte

CAJ - *Cambridge Archaeological Journal*

GM – *Gottinger Miszellen*

IÄF – *Die Inschriften für ägyptischen Frühzeit*

JARCE – *Journal of the American Research Center in Egypt*

JCS – *Journal of Cuneiform Studies*

JEÄ – *Journal of Egyptian Archaeology*

JNES – *Journal of Near Eastern Studies*

MDAIK – *Mitteilungen des Deutschen Archäologischen Instituts Kairo*

MDOG – *Mitteilungen der Deutschen Orient-Gesellschaft zu Berlin*

OJA - *Oxford Journal of Archaeology*

SÄK – *Studien zur Ägyptischen Kultur*

ZPE – *Zeitschrift für Papyrologie und Epigraphik*

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Introduction: Theory, Aims, Methods, Methodology, Chapter Summary

Communities of practice theory is relatively unknown among Egyptian archaeologists. Cooney (2013) is the only investigator to explicitly discuss communities of practice as an approach for interpreting ancient Egyptian artifacts. Her work is a contribution to an edited volume on ‘apprenticeship in the ancient world’ (Wendrich 2013) and, due to the nature of the publication, addresses the theory only at an introductory level. Nevertheless, it is clear from this that communities of practice theory has the potential to answer questions and tackle issues relevant to scholars interested in practice, relationships, craft production and methods of learning/training. My thesis extends and deepens this analysis by investigating the theory through two case studies focused on administrative seal impressions and sealings from the Egyptian Old Kingdom (ca. 2613-2181 bce). This project suggests that communities of practice theory can be used to help archaeologists, working with the fragmentary remains of the past, to reconstruct group dynamics and practices.

This Introduction examines communities of practice theory and its relation to other social theories used in archaeology. Attention is paid to its various components and advantages, the potential hybridization of communities of practice with other theories and issues with it and its application in archaeology. The Introduction also explores administration in Egypt’s Old Kingdom and highlights the relevance of Giza as a case study and the seal impressions and sealings as data.

Chapter 1 investigates chronologies for the Old Kingdom and Giza Plateau. It delineates the textual, archaeological and scientific evidence used in their reconstructions to provide a comprehensive framework for this project’s analyses.

Chapter 2 examines the archaeological evidence for the sites. It describes their stratigraphy, features, materials and periods of occupation as bases for later discussions of administrative activity on the Giza Plateau.

Chapter 3 explores the seal impressions, sealings and sealing-related objects that are the primary datasets used in this thesis. Attention is paid to their contexts, glyptic, object impressions, shapes and administrative functions.

Chapter 4 includes analyses and discussions of results for the first case study. The data excavated at Pottery Mound, a site on the Giza Plateau, are studied with communities of practice theory and statistical analyses, and the outcomes are considered within the context of Old Kingdom institutional administration.

Chapter 5 consists the second case study's analyses and results. Data excavated at several sites on the Giza Plateau are investigated, and, again, the outcomes are explored within the framework of Old Kingdom institutional administration.

The Conclusion describes this thesis' results. It examines the strengths, weaknesses and effectiveness of the theory's application with ancient sealing data. The Conclusion also offers ways to addresses some of the issues encountered in this project, in future studies, and it provides additional observations on how Egyptologists may usefully consider communities of practice theory within the field of Egyptology.

0.1 The Communities of Practice Approach

The concept “community of practice” originated in Lave and Wenger’s (1991) opus *Situated Learning: legitimate peripheral participation*. *Situated Learning* re-conceptualizes the practice of learning as active and interactive rather than as passive and internal. Individuals learn through “legitimate peripheral participation,” a process in which novices and peripheral members learn their profession through social, physical and mental engagement and become more experienced and core members. Doing and discussing are keys to learning because they give the participant the opportunity to make and remedy mistakes in real life as opposed to in theory.

Lave and Wenger (1991: 89-118) introduced the concept “communities of practice” to describe the particular environment in which “legitimate peripheral participation” occurs. Wenger (1998) later expanded the idea of “communities of practice” in his opus *Communities of Practice* in order to explore, in greater detail, the structure of this particular environment and how it enables learning. Critical to his theory is understanding the relationship between people and their environment as dynamic and fluid rather than as one-directional and static. Wenger drew on other theoretical approaches to support this notion and formulate his particular perspective on it. These theories were put forth by scholars in fields as varied as sociology, anthropology and philosophy, and they include situated experience (e.g. Jordan 1989; Heidegger 2008; Gibson 2014), practice (e.g. Bourdieu 1977), structuration (e.g. Giddens 1984) and collectivity (Anderson 1983; Tonnies 2001). These theories influenced Wenger’s central concept: the reciprocal relationship between people and their environment fosters learning. Wenger (1998) created four further theories to explore this idea within the

context of communities of practice: engaged learning, practice, community and constellations of practice.

0.1.1 Engaged Learning

Wenger (1998: 3) adopts the perspective that learning is fundamentally a social and embodied process. This means individuals learn by being with other people and by physically engaging with their world. Wenger (1998: 45) argues people achieve meaning in life by learning to practice together. Learning is physically experiencing actions and interactions with other people and developing an understanding of these people, the acts physically experienced and the environment in which the acts occurred. Meaning is generated through these acts as the people involved develop their understanding as well as their relationships with other people. Both the understanding and the relationships help engaged people create a frame of reference that is meaningful to them because it helps them navigate future actions and interactions.

Learning is also a temporal process. Repeated actions and interactions can cement the information learned, enable the development of new knowledge and deepen the relationships created by the engaged people. Deeper meaning is achieved over time by the continued development of their understanding and by the renewal of their relationships. Both the development of their understanding and the renewal of their relationship create deeper meaning because they help the people involved review and either renew or change their habits.

Lave and Wenger's (1991) notion of legitimate peripheral participation encapsulates this concept within the context of a novice learning a specific profession from a master. Novices learn to practice their trade through repeated, varied attempts to work (actions) and discussions with masters (interactions), and they develop knowledge of their profession (understanding) as well as connections with their masters (relationships) through these acts. Both the knowledge and the connections allow novices to form an internal structure (frame of reference) that allows them to continue practicing their profession. The novices' knowledge and connections deepen over time, which helps them expand their internal structure and practice their profession more successfully. Both novices and current members learn through engaged learning in Wenger's (1998) communities of practice theory.

0.1.2 Practice

Wenger (1998: 45-46) defines practice as a shared roadmap for doing. Examples include the knowledge necessary to solve problems, access resources and develop mutually beneficial relationships as well as daily activity. Practice is both "know-how" and "ways of doing," and Wenger (1998) argues it is created and sustained or transformed through joint enterprise, mutual engagement and shared repertoire.

Joint enterprise is professional activity among a group of people (Wenger 1998: 77-78). It is their collective actions and interactions towards a goal, examples of which include working together on the same task, working side-by-side on different tasks for the same project, and discussing specific aspects of their work. Joint enterprise is doing together, and it provides a context in which people can share their professional knowledge and experience. Having the opportunity to share professional information supports engaged learning through

active participation and discussion in practice. Active participation and discussion supports the production and reproduction or transformation of practice. People engaged in joint enterprise produce and reproduce practice by accepting how other people in the group work, and they transform practice by challenging other people's work and establishing a new way of practicing.

Joint enterprise occurs within the context of professional, but also social, group activity, and the ability to share professional information depends on opportunity as well as the relationships underlying that professional activity. These relationships are crafted through mutual engagement, a process that occurs in conjunction with joint enterprise.

Mutual engagement is social activity among a group of people (Wenger 1998: 73). It is their collective actions and interactions taken as they pursue a goal; however, it is more personal and reciprocal in nature than joint enterprise. Examples of mutual engagement include giving someone a pat on the back before they go into a tough meeting, smiling when a person is talking about their work, or discussing an individual's doctor's visit while working side-by-side. Mutual engagement is supporting doing together (i.e. joint enterprise), and it provides a context in which people can share their thoughts and feelings. The act of sharing personal information supports the development of interpersonal relationships, and these relationships, once built, are sustained through continued interactions. Interpersonal relationships contribute to the production and reproduction or transformation of practice by supporting the process of joint enterprise.

Joint enterprise and mutual engagement support the production and reproduction or transformation of practice by providing people with the opportunities to share information

and develop interpersonal relationships. Shared repertoire also supports the production and perpetuation of practice but in a different way. Shared repertoire is the material and immaterial things a group of people produces through their practice, examples of which include rulebooks, jargon, and artifacts (Wenger 1998: 83). They can be things made in the present or the past and can move among different people through space and time or remain where they were created (Wenger 1998). Shared repertoire helps people in the group learn to practice by providing examples of how and why things have been done. These examples and the discussions surrounding their creation establish protocol, which allows practice to be produced and reproduced; however, they also allow practice to be transformed. Seeing the results of past and present activity and knowing why the activity occurred provide people with the opportunity to challenge it and ultimately reform the practice that created the shared repertoire.

0.1.3 Community

Wenger's expanded notion of community is based on theories of collectivity, his definition of practice (see previous) and the concept of imagination. A community is a group of people with a particular trait in common, and this trait is their source of coherence because it is what binds and keeps them together. Practice functions as the source of coherence in Wenger's communities of practice theory (1998: 73). Mutual engagement and joint enterprise enable the development of socio-professional cohesion through shared activity, and shared repertoire supports this cohesion because it proves the existence of this shared activity. Cohesion developed through practice exists mainly in the present; however, the shared repertoire also enables cohesion through time and across space. The passage of information or material objects among members from different generations or among members living in

different locations creates unity in understanding and action among these disparate members. Discussing information transmitted by members or handling objects crafted by members encourages engagement with the community's practice, an interaction that supports cohesion in its very occurrence. Practice, as joint enterprise, mutual engagement, and shared repertoire, stimulates cohesion and unites members into a community.

Cohesion through practice is crucial to communities of practice theory; however, it is not only through shared activity that people cohere into a community, but rather also through their imaginations. They must believe they are part of a whole. Imagination is an individual's belief that he or she belongs to a larger collective because he or she engages in a shared practice or in a shared way of doing (Wenger 1998: 176). This concept is based on Benedict Anderson's (1983) idea of the imagined community: people who engage in the same practice and who realize they are engaging in the same practice on a daily basis believe they are united through their repeated, shared practice. Anderson (1983: 32-36), a political historian, used this concept to argue nationalism succeeded because people imagined they were part of the same community of newspaper readers: people living in a given nation knew others living in the same nation were reading the same paper and thinking about the same things every day. It was the *belief* in shared practice that mattered most to Anderson and led him to develop the concept of the imagined community. Belief is important in Wenger's theory; however, how it arises and how it is substantiated are also important. Anderson argues belief occurs through its own accord – it is enough to know others engage in the same practice; whereas Wenger argues belief arises and is substantiated from interaction with other practitioners – one must actually engage with other practitioners to develop and strengthen their belief in the community. In communities of practice theory, belief occurs through mutual engagement, joint enterprise and the experience of shared repertoire: through practice.

The communities of practice framework has proved significant for exploring concepts of practice and community and for investigating how people learn and relate to each other through practice. Constellations of practice is a related concept, and it provides a theoretical framework for analyzing how communities of interconnected practices relate.

0.1.4 Constellations of Practice

A constellation of practice is a group of interrelated communities of practice (Wenger 1998: 17). Wenger (1998: 127) argues communities of practice are considered related if they share one or more of the following criteria: historical roots, enterprise, repertoire, a cause, an institution or environment and the same members and the same resources. The individual practices might be unique, but the environments that produced them have one or more things in common.

Constellations of practice are developed and reinforced through things Wenger (1998: 105) calls boundary objects. Boundary objects are material and immaterial items that move among people who are members of different communities of practice (Wenger 1998: 105). Their role is to demonstrate, facilitate and reinforce connections among these different communities by being universally acceptable and usable by all those involved (Wenger 1998: 105, 107).

Constellations of practice is also a perspective on a group of communities of practice that views them as related rather than individual even though each community is defined by a unique practice. It can be used to explore “relations of locality and proximity” that do not necessarily parallel geographic distance and institutional affiliation (Wenger 1998: 130). It

can be used to examine the extent to which different practices are related using a socio-professional rather than a purely geographic or institutional approach. The constellations of practice perspective views relations as occurring through origins of practice rather than through geographic proximity or professional association, and it is this aspect that Wenger (1998) argues makes it unique and extremely useful for thinking about the different ways in which groups of people relate.

0.2 Advantages of a Communities of Practice Approach

Communities of practice theory can, I argue, be used to explore questions typically asked by archaeologists and offer new avenues of research. The archaeological record is often interrogated to understand social units - ethnicities, identity groups, technology groups, networks, etc. - and how their interactions produce continuity or discontinuity in culture and tradition. Communities of practice theory can be used to elucidate another type of social unit – the community of practice – and this unit has several advantages over others. Firstly, it is flexible and permeable: individuals from outside the group can learn to become part of the community through a process called *legitimate peripheral participation* (Wenger 1998: 100). Wenger argues learning occurs through two forms of modified participation: *peripherality* and *legitimacy*. *Peripherality* is a process that allows new members (i.e., those unfamiliar with the practice and on its periphery) to gain exposure to the practice without being full members. Examples of how this process can occur include the inexperienced newcomer spending less time practicing, being assigned fewer production demands or receiving assistance from full members (Wenger 1998: 100). These, and other activities, allow the new member to get to know the practice and its many dimensions as he or she moves from the periphery to the center of the community and ultimately becomes a full member. *Legitimacy*

aids in this process by allowing the newcomer to feel they are being genuinely welcomed into the community as they learn the practice (Wenger 1998: 101). It exists in many forms and can include contributions to the practice, sponsorship by an existing member and pre-existing skills that go well with the current practice. *Legitimacy* gives new members confidence in their inclusion and allows them to learn the practice as they move from periphery to center. Both *peripherality* and *legitimacy* are forms of participation that allow newcomers to learn to practice and become part of the community.

A flexible and permeable model offers advantages since it provides archaeologists with a way to discuss how individuals become part of a group. In other models, people are simply defined as part of the group through distinguishing characteristics (e.g. gender, sex, age, status). Whether these people recognize they are part of the group and how they become meaningfully involved with the group are not questions usually discussed. Communities of practice theory provides a framework for discussing these and similar questions (e.g. whether an individual chooses to be part of their designated identity group) and in so doing, provides archaeologists with a more dynamic model to use and explore in their work.

Second, the community of practice model allows for both homogeneity and heterogeneity. Wenger (1998: 75) recognizes community members are individuals who have different backgrounds and experiences and who have their own ways of doing, of thinking and of engaging with their world. During the process of mutual engagement, these people interact: they talk to one another, share information, skills or opinions and develop relationships. But their actions do not necessarily produce conformity. Community members may interact and agree with each other, but they may also disagree. This creates an

environment in which people can interact and develop relations but do not necessarily become homogenous.

Additionally, individuals, because of their unique personas, will develop differently as they learn to practice (Wenger 1998: 75-76). Some may gain more responsibility and achieve higher status, some may choose to focus on specific aspects of practice and become experts, and yet others may prefer to live on the periphery and contribute only occasionally.

Approaching homogeneity and heterogeneity through communities of practice theory provides archaeologists with a means to begin to overcome the oft-homogenizing nature of traditional archaeological categories (Roddick and Stahl 2016: 3). Studies of various social groupings, for example cultures, ethnicities, identity groups, are very often understood by what unites and binds people and how those qualities reproduce tradition. Communities of practice, in contrast, can allow archaeologists to begin to integrate what distinguishes people into the analysis. How people are different is equally important to how people are the same when considering the reproduction and especially the transformation of a tradition, a culture, or even a practice. For examples where such concepts have been successfully applied in archaeology, see Cordell and Habicht-Mauche (2012) and Roddick and Stahl (2016).

A third advantage of the community of practice approach is as a unit in explorations of continuity and discontinuity in the archaeological record. Wenger (1998: 93) argues practice is comprised of both continuity and discontinuity: the two are not mutually exclusive and can overlap in a single practice. Continuity arises from a shared way of doing together and from the desire not to have to change how things are done (Wenger 1998: 89-90). Artifacts and other instruments (e.g. tools, sayings) that remain in use long after they have

become unwieldy (e.g. the American Imperial system) demonstrate continuity in practice. Discontinuity emerges from individual agency and experiences and through interactions with peripheral members (Wenger 1998: 90). Community members are individuals, and they bring diverse perspectives to the community because they are unique souls, participate in different communities of practice and social groups and interact with different people and groups; therefore, they create new ways of doing and establish new relationships and ways of belonging and producing meaning within the community. Both continuity and discontinuity together define a practice and contribute to how individuals and the group experience that practice.

Wenger's definition of practice and how continuity and discontinuity arise and merge to create practice are fundamental to archaeological questions about the reproduction and/or transformation of a social group (e.g. culture). Previous models have focused on how these groups reproduced their traditions internally or on how outsiders and external influences transformed them. The communities of practice methodology does this too but in a different way: it takes the perspective that continuity and discontinuity result from interpersonal engagement and learning and the continuous development of shared practice. This approach provides an alternative explanation when considering why changes in the form, function and materials of artifacts and artifact assemblages occurred in the archaeological record.

Fourth, the communities of practice theory builds interlocking scales into its model. A community of practice is a small-scale unit of analysis: individuals work together in the same space and interact face-to-face in order to learn and develop their community of practice. Wenger (1998: 126-133) developed the concept of constellations of practice in order to explore connections, learning processes and reproduction or transformation on larger scales

than the individual community. Communities become part of constellations for various reasons, some of which include shared historical roots, related enterprises, shared members or shared artifacts (Wenger 1998: 127). These shared aspects create continuity among different communities and form broader configurations.

Being able to relate a smaller community to a larger constellation is a standard approach adopted by archaeologists as they relate their artifacts, artifact assemblages and single contexts to wider cultural practices. As such, communities of practice theory provides an additional tool for establishing such connections. Wenger (1998: 129) argues boundary objects, styles and discourses are mobile, can move beyond community boundaries and can be shared among different communities (whether intentionally or unintentionally) and ultimately contribute to the formation of broader, shared traditions. Thus, the analysis of patterns in artifact traits and types and the transmission of styles and knowledge, as well as the development of regional or larger traditions, might be explored within this theoretical framework.

In addition, communities of practice theory offers tools to explore how objects and materials constituted past social groups. Wenger (1998: 82-84) developed the concept of the shared repertoire to explore how objects and other things allow a community of practice to negotiate meaning. The shared repertoire is anything (e.g. tools, words, symbols, gestures, ways of doing) produced or used in the course of practice and that demonstrates a history of mutual engagement. It also reifies the community of practice as it is in the present and, when continuously used by members, contributes to what the community will become in the future.

The shared repertoire is therefore a critical conceptual tool for archaeologists hoping to 1) identify a community of practice with artifacts and the archaeological record, and 2) to discuss more specifically the role of physical things in processes of learning and practicing. Archaeologists have practiced the first to a large extent (e.g. Sassaman and Rudolphi 2001; Minar 2001; Stark 2006; Cordell and Habicht-Mauche 2012; Kelly 2016; Gregory 2020), but not the second. How artifacts can be used to learn and negotiate or renegotiate meaning in practice is something uniquely suitable for archaeological inquiry because we study the artifact traits (e.g. material, shape, function, manufacturing methods and technologies) that would impact these processes. For example, the materials from which an object was made could be used to discuss how an individual or multiple individuals might engage with it: whether it can be molded, shaped, transfigured, added to or negated.

Boundary objects (Wenger 1998: 105-108) function in a similar way, but on a larger scale. They serve to negotiate meaning among different communities of practice and enable these communities to develop a sense of coordination and connectedness (Wenger 1998: 105). Boundary objects do not, in fact, have to be objects; rather, they can be anything (e.g. environment, concept, symbol) that allows different communities to develop a shared understanding of their mutual place in the world.

In archaeology, the concept of boundary objects has been scrutinized by a number of investigators (e.g. Minar and Crown 2001; Lyons and Clark 2012; Roddick and Stahl 2016; Dorland 2017). It has been used to explore common ground between or among different communities of practice in order to understand how these communities develop a shared perspective or tradition. Similar artifact types among different social groups is one way the concept of boundary objects has been explored using archaeological data (e.g. Lyon and

Clark 2012). Additional work needs to be undertaken to explore how boundary objects facilitate learning how to engage in specific practices or developing an imagined community.

Finally, communities of practice theory offers a long-term perspective on how the past becomes part of the present. An artifact that was created for a purpose and within a specific context can be used in the present for the same purpose. The U.S. Constitution is a good example of this type of artifact. It was published in 1788 as the legal framework governing America. It is still used today for the same purpose, but by different people with different understandings of how America functions in the present. This artifact, the U.S. Constitution, bridges the temporal gap between lawmakers and administrators in the late 1700's and today, and creates a long-term perspective on its use and influence in American government and society. The boundary object concept suggests artifacts move among people through time in order to precipitate learning. American lawmakers and policymakers have examined and explored the American Constitution (its wording, framework, implications, historical uses and interpretations) in order to discover how best to consider and employ it in the present, and in so doing, they have learned how to use it in their own environments.

Alternatively, an artifact that was created for a reason and within a specific environment can have produced a practice that is employed in the present. The seal is a good example of this type of artifact. Ancient seals are not used in the modern world, but seals, as signatory or protective measures, are used today (e.g. in official state business of governments). The constellations of practice concept suggests individuals build knowledge networks of a given practice that then allow that practice to endure over time. It explains how and why a practice like sealing has survived the millennia, not intact but not fundamentally changed, to be employed in the present with the same purpose.

History has shaped the modern world with artifacts, knowledge, styles, memoranda, declarations and discourses – i.e. through boundary objects – and it continues to shape the world as people integrate these boundary objects into their lives and use them to negotiate meaning in their societies. This modern world is a historical world, and communities of practice theory offers tools and perspectives to explore how and why it came to be. In the words of Faulkner, “the past is never dead. It is not even past” (2011: 73).

0.3 Communities of Practice and Archaeological Theory

Communities of practice theory has been used along with *chaine operateire* theory (e.g. Minar 2001; Stark 2006; Kohring 2011; Hensler 2020), identity theory (e.g. Eckert et al, 2015) and network theory (e.g. Mills 2016) to explore processes of knowledge transfer, craft production, identity construction and other social developments and forms of organization. I argue here that it can also be put into dialogue with material engagement theory and cultural entanglement theory. In this section, I examine how the communities of practice perspective has been used with each of these theories and suggest new ways in which it may be used in the future.

Chaine operateire theory provides the conceptual tools to discuss the process by which individuals make objects. The actual *chaine operateire* is the step-by-step procedure through which tools are made (Leroi-Gourhan 1993: 251-255). Each step is a bodily gesture that is socially constituted and learned through repeated use of one’s body and production materials. *Chaine operateire* theory can be used together with communities of practice theory to discuss how knowledge of production is acquired and shared among individuals and groups in different social contexts and at different temporal and spatial scales (e.g. Minar

2001; Stark 2006; Kohring 2011). It can also be used to define a particular type of community of practice, which, of course, would be a community of production practice (e.g. Kelly 2016; Hensler 2020). Although *chaine operateire* theory is useful, it narrows the type of community to one of production. Additional work on communities of consumption practice, dismemberment practice, conservation practice, destruction practice or discarding practice should also be considered. *Chaine operateire* is an attractive theory because it encourages dynamic discussions of production and because it makes sense on a fundamental and personal level; however, it overshadows some of these other practice communities and should not be used in a vacuum without consideration of other forms of practice.

Identity theory is concerned with identifying groups of people in the archaeological record based on various traits they possessed. Theories of identity can be used with communities of practice theory to explore how people negotiate their involvement in different social groups and how they craft their own identity through practice (e.g. Eckert et al, 2015; Joyce 2021). As alluded to in the previous section, the communities of practice approach has some advantages over identity theory when it comes to discussing issues of character and membership. Community members are a heterogeneous group: they share practice, but part of what makes practice unique in Wenger's theory is its diversity (1998: 75-76) so that even though members share the practice, they engage in both similar and different activities and interactions and with different shared repertoires, and they have different experiences of these shared things, which in turn, reproduces and transforms practice. This differs from most archaeological perspectives on group identity, which tend to focus on similarities in members' personal characteristics or abilities. It allows intra-group dynamics to be more fully explored and the shifting nature of many group identities to be more fully discussed.

In addition, community members become part of the group through legitimate peripheral participation, and they develop modes of belonging that make them, more or less, part of the group and allow them to create their own identities and roles within the community of practice (Wenger 1998). Group identity is a process: people constantly negotiate and renegotiate their environments together through activities and face-to-face interactions and through engagement with the physical world (i.e. landscape, architecture, objects), and, in so doing, produce and reproduce or transform the group identity. This differs from traditional, archaeological perspectives on how individuals become parts of groups: individuals either have or do not have traits or characteristics (e.g. sex) that allow them to become parts of the group or that exclude them from the groups. Communities of practice theory takes a more flexible approach and makes it possible to discuss the process of becoming part of the group as part of group dynamics.

Broadly speaking, network theory is a framework for perceiving connections among different entities. Entities are typically referred to as nodes and the connections between them are called links but may also be designated as ties (Brughmans 2013). Ties between entities may be characterized as either strong, weak or somewhere inbetween, and their designation as such is based on how closely or intimately they are connected (Brughmans 2013). Nodes may also be defined by their degree, closeness or betweenness centrality within the network. A node's degree of centrality is its number of links, its closeness centrality is the average number of links it takes to reach all other nodes in the network, and its betweenness centrality is its access to other nodes (Brughmans 2013: 626; Collar et al, 2015: 17-19).

The underlying principle is that relationships are everywhere, and they are important because they affect the entities involved in the relationship and allow everything from objects

to ideas to move among different nodes. In archaeology, network theory has been used to explore knowledge transfer, object mobility, the movement of people across the landscape, social boundaries and inter-regional interaction (Brughmans 2013: 624). This research agenda is very similar to the one pursued by archaeologists who use communities of practice theory; therefore, it is logical both theories have been used together.

Communities of practice theory can be used to define the specific type of network being analyzed. It would, of course, be a network of practice in which, on the micro-scale, nodes are the individual members and objects and links are practice, time or space; and, on the macro-scale, nodes are different communities of practice and links are practice, boundary objects, brokers, time or space. Several archaeologists have successfully demonstrated how to use networks of practice to explore how knowledge is transmitted across varying scales (Knappett 2011), how relationships with artifacts have produced or in other ways affected relationships at different scales (Blair 2016; Miller 2017), how group identity is formed and transformed across varying scales (e.g. Joyce 2021: 26-28) and how small-scale practices are connected to large-scale traditions and processes (Knappett 2011; Blair 2016).

Communities of practice may also be beneficially put into dialogue with another concept of network analysis developed by Niall Ferguson (2017). In his book *The Square and the Town: Networks and Power*, Ferguson suggests networks are informal groups of people that produce influence, as compared to institutionalized structures (e.g. hierarchies) that are formal groups of people that produce power. He discusses how and through what different channels power and influence circulate and in what environments each functions as currency. It may be useful to consider the type of knowledge generated through a community of practice as influence rather than power. Knowledge, in this context, is influence not power. In

so doing, it may be possible to compare different types of knowledge and the separate roles of influence and power in the shaping of society.

Material engagement theory has not been used with communities of practice theory, but I suggest it can, effectively, offer insight into a critical aspect of communities of practice theory that has been less well-developed: the shared repertoire and, in particular, its role in the learning process. How do the material things produced by the community help members learn to practice and negotiate meaning in the group? Archaeology, with its focus on the physical attributes of artifacts, and material engagement theory, with its focus on how things shape the mind, are uniquely situated to answer this question. Both traditional archaeological and theoretical approaches could be used to analyze specific types of artifacts and data points and to discuss how sensory engagement with particular artifact attributes impacted the learning process in a community of practice. A particularly useful concept within material engagement theory is Thinging (Malafouris 2019: 7-9). Thinging is thinking with and through objects rather than about them. In Thinging, individuals are not separate from the object: they learn from it by engaging with it and by exploring its properties to see what opportunities (e.g. physical, social, psychological) it affords. This concept can clearly be used to explore the modes by which people learn to practice through the shared repertoire as well as what types of information can be learned from the shared repertoire.

0.4 Communities of Practice Critique

Despite offering many advantages, several issues exist with communities of practice theory and its application in Egyptian archaeology. First, the role of power is undertheorized. In the communities of practice methodology, power is viewed as a way to negotiate meaning,

develop practice and formulate identity (Wenger 1998: 17, 91-92, 93, 98). It is neither good nor bad, but simply a way to create, transform and adapt the community. Several scholars argue this perception of power is too broad (e.g. Roberts 2006; Roddick and Stahl 2016) and criticize Wenger and communities of practice theory for it. I would, however, challenge this and suggest that the theory's characterization of power is in fact very effective for the following reasons. It allows the communities of practice methodology to be employed across a range of contexts where power is variable. This theory can be effectively used to explore learning, the development of practice and social dynamics in environments from egalitarian societies to hierarchical regimes. In addition, and to turn the issue of power slightly on its head, Wenger's broad characterization makes power a variable to be explored with communities of practice theory. It is the investigator's responsibility to examine the different power dynamics in their data and determine how they impact the group. Each new case study will shed light on power's role and contribute to a more precise definition of power in communities of practice theory. This thesis addresses the hierarchy within ancient Egyptian administration and knowledge networks among community members to explore the different power relations and how these impact both practice and institutional governance.

Second, the implications of scale are not completely considered in the theory. Wenger (1998) developed the concepts of "constellations of practice," "boundary object," and "broker" to explore principles of communities of practice theory at larger, more divergent and more diffuse analytical levels, but these terms do not answer the fundamental question of how members learn when face-to-face interaction is not possible. This critique is justified because it highlights the lack of information about a critical aspect of communities of practice theory, but I would again suggest the researcher look to their own work in order to explore the learning processes at larger scales. Data will suggest something – the rate of

transmission, the information passed on – about how different community members learn. Scale is very often taken into account in studies of ancient Egyptian administration. These typically delineate whether the administration under examination is local, regional or national and often explore how these different levels interact. My investigation will examine both local and site-wide administration and attempt to explore how these networks interact with communities of practice theory.

Third, individual members can be difficult to identify in the archaeological record. In communities of practice theory, people are important because their actions and interactions affect the learning process and the community's social dynamics. Individuals actively participate in mutual engagement, joint enterprise and shared repertoire and thus produce and reproduce the community. Archaeologists generally approach this issue by ignoring it and by engaging with other aspects of the theory. Processes of knowledge and skill transfer as well as group identity formation and intergroup interaction have been frequently investigated in studies with archaeological data (e.g. Eckert et al, 2015; Mills 2016; Hensler 2020). These analyses are exciting because they have led to information about regional networks of interaction and the creation and development of different styles and discourses. Nevertheless, these studies obscure the individual and his or her role in a community of practice: they focus on the group rather than the people who comprise it or on the practice rather than the people who engage in it.

One way of identifying individuals in the archaeological record, and perhaps the only definitive way to do it, is to use artifacts, architectural elements or other forms of archaeological materials related to or inscribed with writing that clearly identifies a relationship between them and objects. Administrative sealings, the objects analyzed in this

thesis, and their seal impressions can be used to identify individuals and to discuss different internal dynamics of a community of practice in a way that has not previously been undertaken. The community of administrative sealing practice brings together people of different ranks, in different professions, of different generations and even with different skills or roles in the community (e.g. door sealer versus papyrus sealer). All of this information can be used to reposition the individual and explore his or her potential impact on the internal dynamics of the group.

The final issue to consider is how to reconcile concepts of time in communities of practice theory and in archaeology. Both historical context and the lived experience are factors in the production and development of practice (Wenger 1998: 13). People become part of and contribute to the community both through their own agency and within the socio-historical context of the community itself. This means they are capable of choosing their own paths and of changing existing structures, but are, nonetheless, products of the past.

The time scale of the archaeological deposit is the main factor in archaeological analysis. It may be recorded in texts (e.g. king's reign, ceremonial event), or through artifacts, if a temporal typology can be reconstructed (e.g. ceramic typology). Both types of chronologies typically relate to a longer time scale than the lived experience, which could be problematic for archaeologists engaging with communities of practice theory; however, the theory brings a new perspective to the archaeological record to identify shared practice in and throughout time. In her work on the archaeology of childhood, Baxter (2008: 166) suggests that ideas of who is present in the material record of an archaeological site need to change in order to get closer to the lived experience. This same perspective can be brought to bear with communities of practice theory and be used to explore not only those who are visible in the

record, but also how they may be identified. This thesis explores administrative sealings, which may be employed to identify individuals in the archaeological record (see above). It is plausible to suggest that ancient people engaged with these objects in lieu of the actual people who created and used them if the archaeological deposit supports this notion. Whether individuals were able to engage with each other and thus participate in the lived experience of interaction face-to-face or through the historically situated shared repertoire matters less than the fact of engagement itself. Additionally, the lived experience encompasses more than the experience of people: it includes the experience of their surroundings. They might have practiced at different times but in the same physical environment. The extent to which the lived experience can be elucidated from the archaeological record will depend, to a large extent, on the case study chosen for analysis. This thesis examines several deposits excavated at Pottery Mound, Giza, which I argue below provide excellent data to examine both the historical context of the sealing community that worked there also their lived experience, albeit only to a limited extent.

The archaeological record rarely allows archaeologists to explore face-to-face interactions through material media, but it can still provide insight into past interactions through an embodied exploration of artifacts. In the same way archaeologists use artifacts and material traces to explore past practice and embodied discourse, community members who practice can be said to interpret the shared repertoire in order to produce and reproduce practice. This is a type of engagement, albeit not face-to-face, and is the best way to view communities of practice interactions within an archaeological context.

Face-to-face interaction need not be prioritized in archaeological studies that employ communities of practice theory: rather, the results of the interactions – embodied practices –

must be considered. Communities of practice theory cannot be completely and comprehensively applied to ancient data because it relies too heavily on known characteristics of people, but aspects of it can be effectively used to interrogate the material record and discuss the learning process and the production of practice.

0.5 Administration in the Egyptian Old Kingdom

The administration of Egypt in the Old Kingdom (ca. 2613-2181 bce, 4th through 6th dynasties) has received considerable attention in Egyptology. The plethora of publications devoted to this subject attest to the fundamental place it holds in the field and provide scholars with robust literature for research. The earliest studies tend towards the documentation and examination of ranks and titles found in the tombs of officials located at Memphis or occasionally elsewhere in Egypt. The *Index of Names and Titles of the Old Kingdom* (Murray 1908), *Untersuchungen zu den Beamtentiteln des ägyptischen Alten Reiches* (Helck 1954), and *Rank and Title in the Old Kingdom: the structure of the Egyptian administration in the fifth and sixth dynasties* (Baer 1960) are some key titles in this literature. They bring an understanding of, primarily, the central administration's hierarchical structure and different offices, and they offer useful indexes for further studies. More recent research has explored specific professional titles, the positions of their holders in a hierarchy and investigations of named officials: see, for example, *Untersuchungen zum Titel S3-njswt "Konigssohn"* (Schmitz 1976) and "The Title "Property Custodian of the King" in the Old Kingdom" (Barta 1999). A continuing focus on rank and title is demonstrated by more recent publications, such as *An Index of Ancient Egyptian Titles, Epithets and Phrases of the Old Kingdom* (Jones 2000) and *Les scribes dans la société égyptienne de l'Ancien Empire. Vol 1: les premières dynasties les nécropoles memphites* (Piacentini 2002).

Research on provincial administration developed in the second half of the twentieth century. “Four Provincial Administrators at the Memphis Cemeteries” (Fisher 1954), *Les nomes des domaines funéraires sous l’Ancien Empire* (Jacquet-Gordon 1962), and “Town and State in the Early Old Kingdom: a view from Elephantine” (Seidlmayer 1996), for example, provide important insights into the relationship between center and periphery as well as a more detailed investigation into the structure and nature of regional governance. This trend has continued over the last two decades and has done much to correct previous assumptions of top-down control. “The Territorial Administration of the Kingdom in the 3rd Millennium” (Moreno-Garcia 2013b), “Scaling the State: Egypt in the Third Millennium BC” (Bussmann 2014) and *L’administration provinciale sous l’Ancien Empire égyptien* (Martinet 2019) explore this issue with fresh perspectives and contribute a more dynamic understanding of the complicated and at times difficult relationship between royal power at the capital Memphis and regional control in the territories.

Overviews of Old Kingdom administration first appeared in the later twentieth century and continue to be published up to the present day. Foremost among these works are *Wirtschaftsgeschichte des Alten Agypten im 3. Und 2. Jahrtausend vor Christus* (Helck 1975), *The Egyptian Administration in the Old Kingdom: evidence of its decline* (Kanawati 1977) and *Ancient Egyptian Administration* (Moreno-Garcia 2013, 41-258). They offer broad perspectives on the development of the administration and permit limited glimpses into its key elements.

Research on administrative seals and sealings and the practice of sealing was begun in the late 1970’s with *Die Rollsiegel des Alten Reichs* (Kaplony 1977-1981), a revolutionary and comprehensive tome on the subject that yielded an index of objects and the titles, ranks,

and epithets discovered on them as well as a preliminary categorization of sealing types, something previously unexplored in Egyptian archaeology¹. Additional studies have been undertaken subsequently: *Die Siegelabrollungen und Rollsiegel der Stadt Elephantine Im 3. Jahrtausend V. Chr.* (Patznick 2005), “Preliminary Report on the Seal Impressions found at the Site Chufu 01/01 in the Dakhla Region” (Forster 2008), *Mud Sealings and Fourth Dynasty Administration at Giza* (Nolan 2010), *Clay Sealings from the Pyramid Complex of Raneferef Kept in the Naprstek Museum: general features of the corpus and its potential to the study of the administration of the royal funerary cult* (Jerabek 2018), and “Late Third Millennium Sealings from Balat, Dakhla Oasis” (Pantalacci 2021) are some examples of this expanding literature. These works tend to focus on the seals and sealings excavated at particular sites and how the objects reflect administrative practice and relationships both locally and across Egypt. The titles, ranks and epithets identified on the sealings provide information on the organization and structure of the administration (both centralized and local). The reverse impressions reveal the materials to which they were attached and indicate some of the daily practices sealers enacted as part of their administrative duties: sealing items for storage, sealing magazine or workshop doors for security, and sealing scribal kits and breaking these sealings to retrieve their tools and start their day. Such detailed images of life as an official are infrequently found with other types of evidence, and these studies provides researchers with insight into how sealers functioned in the administration.

Within the last decade, research has begun to approach administration from a more explicitly theoretical perspective. Very few examples of this type of work exist, but those that

¹ It was not until the late 1960’s at Phaistos (Fiandra 1968) that an archaeologist turned over a sealing, examined its “backside” (i.e. unimpressed or uninscribed side) and created a typology. The practice of categorizing sealings based on their reverse impressions and shapes moved from Greek archaeology to Middle Eastern archaeology and eventually to Egyptology. Kaplony’s publication was a step in that process.

do have led to interesting observations on the patronage system (Moreno-Garcia 2013, Warden 2013) and other social networks involving elite provincial administrators (Martinet 2020). My own work will complement these studies by providing new insight into the social organization and relationships of sealers in the central administration. The hierarchy and family ties among elite administrators have been well-documented; however, the potential for other types of associations in the upper echelon has not been investigated. Thus, my research will challenge the notion of a predominantly top-down framework and suggest other ways than the formal hierarchy, through which officials interacted and controlled their work. Theoretical perspectives, on various topics, have become more common in Egyptology in the last decade (e.g. Howley and Nyord 2018; Kilroe 2019; Olabarria 2020), but their value has yet to be fully recognized in the sphere of administration. My thesis will contribute positively to this move toward a more progressive program of research in the field.

0.6 Case Study and Significance

A primary goal of this thesis is to apply communities of practice theory as a methodology to explore the social organization of officials in the central administration beyond their hierarchical ranks (e.g. Baer 1960; Strudwick 1985) and familial ties (e.g. Baud 1999). Giza presents as a useful case study because it offers insight into this particular type of administration and administrator: communities of practice theory can be used to uncover relationships other than those based on formal and kinship ties and in so doing allow for the reinterpretation of sealing evidence to reconsider current perspectives on administrative structure and organization and on sealing practice in ancient systems of government more generally.

Giza is located on a limestone plateau 16km distant from the ancient capital at Memphis. Excavations over the last century and more have uncovered a significant number of tombs belonging to high-ranking officials in the central administration. Many of these bear inscriptions and autobiographical texts naming the tomb's owner and his ranks, titles and kin-relations (e.g. Seshemnefer I (Kanawati 2001); Seshemnefer II (Kanawati 2002); Seshemnefer III (Junker 1938); Hemiunu (Junker 1929); Wepemnefret (Reisner and Fisher 1914)). These inscriptions indicate the tomb owners were officials with power in the central administration and suggest the Giza plateau was a site where these specific people operated in life as well as being the place of their burial.

Further work has established that Giza was a bustling settlement with numerous individuals, communities and professions that supported the royal necropolis as well as the wider economy. Artisans produced royal sculptures, jewelry and other specialty items that could be deposited in burial chambers or shipped upstream to cities in middle or southern Egypt (Lehner 2013; 2015b). Potters produced ceremonial or ritual vessels for the tombs as well as utilitarian objects for everyday use by pyramid laborers, sculptors and all those living and working at Giza (Wodzinska 2007a; 2007b; 2007c; Hawass and Senussi 2008; Wodzinska 2009). Architects designed the royal tombs and tomb builders constructed them, while bakers and cooks supported everyone at Giza with food (e.g. bread) and drink (e.g. beer) (Hawass and Senussi 2008; Hawass 2009: 148-157). Priests and other religious personnel maintained the cult of the dead king both immediately following his death and burial as well as across several generations (Lehner et al, 2012; Nolan 2014). Ships docked at Giza bringing merchants, traders, ship crews and their captains, all of whom likely stayed in temporary housing on the Giza Plateau (Lehner 2013; 2014). They unloaded materials destined for the royal tombs and loaded others intended for cities and towns in middle or

southern Egypt. Finally, scribes recorded the comings and goings of individual workers and the distribution of rations as well as the goods moved between the settlement and the wider country. All of these people, and their families, lived, worked or otherwise passed through Giza and made it a hub of royal administrative activity. These qualities – its proximity to the capital, highly centralized administrative activity, and population employed by the royal government – make the site and associated evidence significant as a case study for discussing the social organization of central officials with communities of practice theory, not least because there are many identifiable groups (e.g. scribes, granary officials, public works officers) to which administrators belonged. That said, it should be noted that Giza is, by its close relationship to the center of government, rather exceptional and, as such, might not be representative of practices found either in the provinces (e.g. at Balat) or even at a short distance from the capital (e.g. at Abusir, where administration of the sun temples and pyramid complexes presents a unique context for the study of administrators who participated in sealing practices in both environments). Additional studies of regional administration using communities of practice theory will be necessary to uncover the social organizations of these regions, but that undertaking falls outside the scope and goals of this work.

In this thesis, I analyze Old Kingdom seal glyptic, sealings and sealing-related objects excavated at multiple sites in Giza (Introduction: Case Study). Old Kingdom seals are relatively small², cylindrical or button-shaped objects made from various materials³ (Wegner

² Seal size varies during the Old Kingdom, but a comprehensive study of the varying sizes has yet to be conducted. Such a study could answer the question of whether a correlation between size and function exists, and it would provide scholars with a complete dataset for comparison with seals excavated in the future. It would also provide a dataset for comparison with seals of unknown provenance, which could be used to suggest whether a seal was ancient or modern (i.e. real or forged).

³ Old Kingdom seals were less frequently made from other types of stones as well as wood, ivory, gold and other metals, but a complete study of the materials used in seal production has yet to be undertaken. Such a study would determine the frequency with which each material was used, and it could be used to reveal whether a relationship between material and function exists. It would also

2018). They can be engraved with either hieroglyphic or graphic symbols and can convey either administrative or personal information. Administrative information consists of key facts about the seals' owners (e.g. titles, names, kings for whom they worked, departments in which they worked) and/or about the objects they controlled (e.g. types, origins, destinations)⁴. Officials impressed or stamped seals onto sealings. Sealings are wet lumps of clay employed to close and secure storage or transportation containers and storeroom doors in order to secure the items inside. They can be made from either desert (taffla) or riverine (i.e. Nile) clays⁵, and their sizes and shapes depend on the types of objects to which they were attached. Sealing-related objects are here defined as the clay byproducts of seal production (e.g. cores, blanks, discarded sealings) and the clay objects used with sealings in administration (e.g. tokens) (Nolan 2010).

Administrative seal glyptic, sealings and sealing-related objects were excavated in abundance at Giza. More than 4500 objects were recovered in an urban environment called the Heit el-Ghurob (i.e. the Wall of the Crow). The majority were dug in a trash heap designated Pottery Mound, located outside one of the larger buildings. Pottery Mound is a heap of apparent debris in which sealings, sealing-related objects and a seal were excavated among other artifacts (e.g. animal bones, pottery sherds, painted plaster fragments). This sealing corpora forms the dataset for my first case study. Additional sealing datasets from other sites in Heit el-Ghurob and Giza represent my second case study. Both the archaeology and the sealing corpora are described in detail in Chapter 3 and Chapter 4, respectively.

provide a comprehensive dataset for comparison with seals of unknown provenance, which could be used to suggest whether a seal was genuine or fake.

⁴ Knowledge of administrative information is based on our ability to translate hieroglyphs, but it is not complete because the meaning of graphic symbols often remains beyond our understanding.

⁵ Sealing material is an understudied aspect of sealings and sealing administration. An investigation into the frequencies of sealing materials could shed light on the objects' origins and degrees of mobility. Additional scientific analysis would provide details about the clays' mineral makeups and indicate more exact locations of origin.

Other sites with significant Old Kingdom administrative sealing corpora include Abusir and Elephantine. Abusir lies on the west bank of the Nile, southwest of modern Cairo and near the ancient capital at Memphis. It consists of several royal funerary complexes and associated settlements, sun temples and a cemetery for low-ranking officials (Barta 2001; Posener-Krieger et al, 2006; Nuzzolo 2010). A likely significant number of seals, sealings and sealing-related objects was excavated at Abusir, but the exact number is not known, partly because the records of excavation report inconsistent object numbers, but also because the original artifacts and notes were destroyed in World War II. Jerabek (2018) recently studied the sealing technology excavated in Raneferef's Pyramid Complex of the 5th Dynasty at Abusir and determined roughly 1000 objects had been excavated in this area. Verner (2006) and Jerabek (2018: 29-30) analyzed the seal glyptic and concluded it related to royal administration. Jerabek (2018: 25-28) also studied the sealings' reverse impressions and shapes and determined bags, boxes, jars, papyrus documents and peg-and-string devices were shut and secured with sealings for an institutional administration. The rest of the artifacts remain to be studied and published. A further 180 sealings were excavated in Queen Khentawes II's Pyramid (Verner et al, 1995). Verner et al (1995) analyzed the glyptic and published their findings in the Abusir series. Borchardt (1907) records having excavated thousands of sealings in the Neferirkare Funerary Complex; however, Posener-Krieger and de Cenival (1968) published only 72 sealings from this same area. These latter sealings all bore royal names, and it seems possible that Posener-Krieger and de Cenival only included the sealings with kings' names in their publication. Additional sealings were excavated in Userkaf's Sun Temple; however, their number is unknown. Borchardt (1907: 41) suggests a large number of sealings but registers only 13, and later excavations yielded just 50 sealings (Kaplony 1969: 83-84). These findings are important because they speak to the key roles seals, seal impressions and sealings played in Old Kingdom administration.

The ancient site of Elephantine is located in modern day Aswan⁶ in Upper Egypt. Long-term excavations conducted by the German Archaeological Institute have yielded extensive evidence for a large-scale settlement and small-scale cemetery dated to the Old Kingdom (Moeller 2016: 164). The remains of a large mud-brick building were excavated on the western island. It consists of several walls, waste dumps and a terraced courtyard, and it is estimated to have covered 375 meters squared. Sealings, beer jars and bread molds excavated within it suggest the structure functioned as an administrative complex (Moeller 2016: 166-168). A seal impression with the inscription “Seal Bearer of Lower Egypt, Arbiter of/at the Royal Court” (Moeller 2016: 168) further supports this claim and indicates a connection between the administration at Elephantine and the capital despite the extensive distance between the two sites. The ruins of a large mud-brick building were also excavated on the eastern island. Seal impressions with the Horus names of Khufu, Radjedef, Khafre and Menkaure were excavated in this building and indicate administrative activity during these kings’ reigns. Additional seal impressions with the names of 4th Dynasty rulers were excavated in the fill of a structure called the “governor’s residence” located in the southeastern part of the eastern island (Moeller 2016: 174). The structure of the deposits in a slope from north to south suggests the building from which the sealings originated lay to the north of their findspot. Both deposits with royal names would suggest administrative activity in the 4th Dynasty at Elephantine was connected to the royal institution in the capital at Memphis, although the degree to which it was controlled by the central power may be debated (e.g. Bussmann 2010, 2015).

⁶ The island location has the potential to alter our understanding of the administrative practices executed at this site because of its unique geography; however, research into this perspective falls outside the bounds of this project.

Overall, the Old Kingdom layers yielded 1600 seals, sealings and sealing related objects (Pätznick 2005). Pätznick identified two types of seal based on shape: cylinder and stamp. The discovery of stamp seals and stamp seal impressions is interesting because cylinder seals and cylinder seal impressions dominate the corpus of surviving evidence for the early Old Kingdom sealing administration. Stamp seals or stamp seal impressions have also been excavated in administrative contexts at Ayn Asíl (Pantalacci 2013) and Ayn el-Gazzareen (Mills and Kaper 2003). Both sites are located in the Western Desert and, similar to Elephantine, far from the capital. Research conducted by Wiese (1996) and Dubiel (2008) on Old Kingdom and First Intermediate Period (ca. 2181-2055 bce) seals indicates the Egyptian administration transitioned from cylinder seal (the sealing technology of the central authority) to stamp seal (perhaps to be associated with a local form of administration) as the royal institution began to lose regional control and some provincial centers began to assert greater authority. The transition may not have occurred as linearly as previously suggested, and stamp seals might, indeed, have been used prior to changes in the Old Kingdom royal institution.

Pätznick (2005) also identified several categories of seal based on glyptic content and style (e.g. Amtssiegel, Berufssiegel, Namensiegel). These categories indicate seals and sealings were used in royal and local institutional administration as well as private administration. The relatively few examples of seal glyptic related to royal administration suggest only a distant connection between Elephantine and the capital. This is interesting considering the probable royal need to control Egyptian borders in the south, and it might be the result of the great distance between Elephantine and Memphis and the strong history of local tradition at this site (Bussmann 2010).

In addition, multiple sealing types (e.g. door, jar, papyrus) were identified in the sealing corpus based on the sealings' shapes and objects or materials impressions on their backs (Pätznick 2005). Very few papyrus sealings were excavated compared to what might be expected from a large settlement with administrative functions, which may suggest only infrequent communication with the royal administration at Memphis (Bussmann 2015: 5); however, the limited frequency with which this type of sealing is recovered from excavations more widely (e.g. Balat) does not allow for such a conclusion to be reached with any level of certainty.

In addition, smaller corpora of seals, sealings and sealing-related objects have been excavated at Balat (Pantalacci 2001; 2013), Hierakonpolis (Bussmann and Friedmann 2018; Bussmann 2021) and Elkab (Regulski 2009). These have been studied to greater or lesser degrees, and the information on titles and sealing types they yielded has proved useful to studies on Old Kingdom administration because it shed light on the hierarchy and function of sealings in state institutions.

0.6.1 Studies of Old Kingdom Sealing Data

The earliest studies of Old Kingdom seals focus on their glyptic (e.g. Fischer 1972; Teissier 1987), that is, the hieroglyphs or graphic symbols engraved into seals or impressed into sealings. Hieroglyphic glyptic can often be read, and the text usually refers to the people and things (i.e. commercial goods, material resources, gifts) being managed with the seal technologies. Symbolic glyptic has generally proved more difficult to interpret; they are typically documented in publications but without further analysis.

Several of these studies draw on seal glyptic to explore the use of different seals and their roles in Old Kingdom administration. Kaplony (1977), for example, compiled an index of known Old Kingdom seal glyptic and developed a classification system for the different types of seals used in Egyptian administration based on this data. The main seal types have been designated Amtssiegels (official), Beamtensiegel (civil), Verwaltungssiegel (administrative), Figurensiegel (figural), and Königssiegel (royal), where each type displays distinct glyptic and played a different administrative role. This typology is widely accepted in contemporary literature on Old Kingdom seals, sealings and sealing administration (e.g. Pätznick 2005; Nolan 2010; Jerabek 2018). Pantalacci (1996), for example, examined both hieroglyphic and symbolic glyptic from the Old Kingdom and suggested illiterate people might have used both types of glyptic in the administration.

Other studies use seal glyptic to investigate the offices, institutions and hierarchical structure of Old Kingdom administration. Baer (1960), for example, published his analysis of titles found on seals, seal impressions, papyri and tomb walls from Old Kingdom Egypt. He uses them to explore the structure of administration in the 5th and 6th Dynasties and reconstructs a hierarchy comprised of the social elite who supported the king as head decision-maker. Strudwick (1985), for a second example, documents the use of six titles⁷ of the central administration on seals, seal impressions, tomb walls, and papyrus documents and analyzes these titles in order to determine when each title first appeared, for how long it was used, who used it, for what purpose it was used and to what other offices and institutions it was related. His work compiles contemporary information about the offices and departments

⁷ The titles include overseers of the great mansions, overseers of the scribes of king's documents, overseers of works, overseers of the granaries, overseers of the treasuries and viziers.

of the Old Kingdom central administration into one publication, and it demonstrates the significance of this type of study by including both lists and analyses of the titles.

More recent analyses have focused on the impressions left on the reverse of sealings by the objects they closed and secured. These are called either reverse or object impressions, and they are important because they shed light on how sealings were used within administration. Pätznick (2005), for example, studied the reverse impressions of the sealings excavated at Elephantine and 1) developed a site typology for the sealings complete with sample drawings and 2) used the sealings to discuss the administration at Elephantine during the Old Kingdom. Blöbaum (2021), for another example, examined sealings excavated at several sites and created a typology for Old Kingdom and Early Dynastic sealings. Her typology is an update of Engel and Müller's (2000) previous sealing typology: it includes data from across Egypt, instead of only from Upper Egypt, and sealings excavated in both settlement and cemetery contexts, instead of only cemetery contexts.

While to date the data derived from archaeological excavations has been used to reconstruct hierarchies of senior administrators, there has been little work on understanding the day-to-day practices involved in sealing, the roles of officials – at all levels - within these systems, and the methods by which they learned their roles⁸. Communities of practice offers a means for investigating these issues, and it is to this that I will now turn.

⁸ The archaeological and textual evidence for learning administrative sealing (specifically how and where the learning occurred) in ancient Egypt will be discussed in Chapters 4 and 5.

Chapter 1: Chronology

In this chapter, I provide a chronological framework against which the Old Kingdom seal impressions and sealings at the heart of this study can be related. A number of chronologies have been constructed by investigators drawing on the fragmentary historical and archaeological evidence. I examine this evidence (section 1.1) and compare a range of options (section 1.2) in order to determine which framework is most appropriate to use in my work. I then explore the evidence for site-specific chronologies (section 1.3) and describe the chronological framework of Pottery Mound (section 1.4) and Giza (section 1.5).

1.1 Evidence for reconstructing a chronology for the Old Kingdom

A chronology of ancient Egypt has been constructed from a combination of relative dating methods, such as text, archaeologically derived stratigraphy, absolute chronologies based on calendrical and astronomical records obtained from ancient texts and scientific methods, such as radio-carbon dating. None of these approaches on their own have proved reliable. Surviving king lists have been influential in reconstructing frameworks against which other data is set. These lists have traditionally been divided into a series of Dynasties, Kingdoms and Periods, the viability of which has been much debated (e.g. Redford 2000; Murnane 2000; Schneider 2008; Baud 2010; Shaw 2013). Schneider (2008), for example, concludes that such arrangements can only be used to help orient the researcher. Indeed, Shaw (2013: 740, 742) questions the distinction between Dynasties and Periods and argues for the use of a materials-based chronology supported by radiocarbon dates. Here I adopt

traditional terminology but highlight the relevant textual (section 1.1.a) data that supports the existence of a distinct ‘Old Kingdom,’ which can be divided into three dynasties⁹.

Central to the reconstruction of Old Kingdom chronology are the Palermo Stone and associated fragments, the Turin King List, the Abydos King Lists, the Saqqara King List, Manetho’s *Aegyptiaca* and records of astronomical events.

1.1.1 The Palermo Stone

The Palermo Stone, held in the Regional Archaeological Museum Antonio Salinas in Palermo, Italy, represents a fragment of a large basalt stele engraved with a list of kings. It can be associated with six other fragments similarly inscribed with royal annals. Five stones are currently housed in the Cairo Museum and are called the Cairo Fragments. One stone is housed in the Petrie Museum in London and is called the London Fragment. Each stone was identified independently of the others on the antiquities market in the late 19th or early 20th centuries (Wilkinson 2000). The lack of context makes it difficult to understand the stele’s original purpose but much of the detail in the text can be corroborated with other ancient sources. The result is the record of a sequence of Old Kingdom kings: Sneferu, Khufu, Djedefra, Menkaure and Shepsekaf (traditionally representing the 4th Dynasty), followed by Userkaf, Sahure and Neferirkare of the 5th Dynasty (Wilkinson 2000). The name of Khafre (builder of the second Giza pyramid) is missing, but this is probably due to the fragmentary

⁹ Some scholars (e.g. Baud 2010; Gundacker 2015), but not all (e.g. Wilkinson 2000; Hornung et al 2006) include Egypt’s 3rd dynasty in the Old Kingdom, but I have chosen not to because there is a distinct break in administrative practices (Piacentini 2008: 85; Engel 2013: 19, 20-21) between the 3rd and 4th dynasties that makes it more logical to incorporate only the 4th to 6th dynasties in the Old Kingdom for this thesis. Some administrative practices may be lost to scholars in the present due to the only partially preserved nature of the archaeological record, but, as we cannot speculate on these without further evidence, I maintain the break between the 3rd and 4th dynasties in this project.

nature of the stele. Although the text provides the lengths of reigns of some rulers, many are lost or not recorded and these, as well as the reliability of the surviving information has to be reconstructed from other sources. Ricci (1917), for example, suggests 24 years for Sneferu, 3 years for Shepsekaf, 9 years for Userkaf, 14 years for Sahure and 11 years for Neferirkare.

1.1.2 The Turin King List

The Turin King List (see figure 1.1), in the Musei Egizio, Turin, is a fragmentary papyrus with a hieratic text noting the names, titles, reign lengths, possible dynastic associations and chronological order of a significant number of rulers¹⁰ (Ryholt 2004: 138). This information is recorded in 11 columns arranged sequentially from right to left across the papyrus. The first three columns list ancient Egypt's god and spirit kings, and the last nine columns list human pharaohs from the 1st to 17th Dynasties (Ryholt 2004: 138-139). Headings and summations for different groups of historical kings are also found in rows in the columns (Ryholt 2004: 139-140, table 3). A tax register has been found on the reverse side of the papyrus referencing Ramses II (1279-1213 bce) (Redford 1986: 2), suggesting that the List was composed during the Ramesside Period at the earliest (e.g. Redford 1986: 2; Ryholt 2006: 26).

The fragmentary nature of the Turin King List (some 300 pieces) makes using its content challenging (Ryholt 1997; 2004: 135). The content does, however, find parallels with other king lists. Twenty-four spaces for Old Kingdom rulers are evident, but only the names

¹⁰ These rulers are typically identified with the Predynastic Period-Second Intermediate Period. The Old Kingdom falls between these periods; therefore, the Turin King List is often used to reconstruct the chronology of this period.

of Sneferu, Khafre, Userkaf, Menkauhor, Djedkare, Unas and Netiqerty¹¹ are preserved (Baud 2006; Verner 2006). The remaining kings and their places in the order are assumed based on external evidence. Lengths of reigns for some kings whose names are not preserved have been fitted into a sequence: Sneferu-24 years, Khufu-23 years, Djedefra-8 years, Menkaure-18 years, Shepsekaf-4 years, Thamphthis-2 years, Userkaf-7 years, Sahure-12 years, Shepsekare-7 years, Raneferef-1 year, Menkauhor-8 years, Djedkare-28 years, and Unas-30 years (Verner 2006). Reign lengths for Khafre, Bicheris, Neferirkare, Niuserre and the 6th Dynasty rulers have been lost or the data recorded is inconclusive (Baud 2006; Verner 2006). The accuracy of some of the above reign lengths has been called into question; however, this problem is often mitigated through comparison with other historical sources and archaeological evidence (Verner 2006).

The Turin King List has also been used to explore how this period of Egyptian history was understood during the Ramasside period, which has been influential in shaping modern approaches for grouping kings. Kings designated as belonging to the 4th, 5th and 6th Dynasties, as well as those identified as forming the 1st-3rd and 7th-8th Dynasties, are listed under the First Heading (column 3, row 10) ‘Kings of the House of (?) King Menes (Ryholt 2004: 141). These rulers are further divided by Summations, which are the totals of the number of years these groups of kings reigned: kings identified as belonging to the 1st to 5th Dynasties appear in the First Summation (column 4, row 26); those belonging to the 6th-8th Dynasties are summed in the Second Summation (column 5, rows 14-15); the rulers of the 1st-8th Dynasties are summed in the Third Summation (column 5, rows 15-17) (Ryholt 2004: 141, table 3).

¹¹ The position of Netiqerty as the last ruler of the 6th Dynasty has been questioned and discussed at length in the scholarship on late Old Kingdom chronology (e.g. Beckerath 1962; Ryholt 2000; Baud 2006).

1.1.3 The Abydos King Lists

Seti I (1294-1279 bce) and his son Ramses II (1279-1213 bce) commissioned king lists to be carved into their temple walls at Abydos (see fig. 1.2). Seti I's list is located in his mortuary temple on the western wall of the passage leading from the Second Hypostyle Hall to the Butcher's Hall (Redford 1986: 18). It is organized into three rows: the top two rows contain the cartouches of rulers from Menes to Seti I in chronological order, and the bottom row contains only cartouches of Seti I (Redford 1986: 19).

Ramses II's list is located on the western wall of chamber 2 and east of the First Octosyle Hall in his temple at Abydos (Redford 1986: 20). It is structured in a similar way to Seti I's list but is comprised of four rows rather than three rows and incorporates Ramses II's cartouches on the bottom row instead of Seti I's cartouches (Redford 1986: 21).

Both lists present the following sequence of kings: Sneferu, Khufu, Djedefra, Khafre, Menkaure, Shepsekaf, Userkaf, Sahure, Neferirkare, Neferefra, Niuserre, Menkauhor, Djedkara, Unas, Teti, Userkara, Pepi I, Nemtiemsef I, Pepi II, Nemtiemsef II and Netjerikare (Ryholt 2000). Userkare (2nd king of the 6th Dynasty) is a notable inclusion because he does not appear in the other main sources. His presence brings the total of 6th Dynasty rulers to seven. The hypothetical 6th Dynasty of the Turin King List also contains seven pharaohs; but the names of the first six rulers are not preserved, and it is impossible to determine whether Userkara was originally included in this document.

1.1.4 The Saqqara King List

The Saqqara King List (see fig. 1.3), in the Egyptian Museum in Cairo, was part of Tjuloy's (Ramses II's reign, 1279-1213 bce) wall relief in his tomb chapel at Saqqara (Redford 1986: 21). It consists of 58 vertical cartouches in two rows of 29 cartouches (Redford 1986: 21). The cartouches are arranged in reverse chronological order from Ramses II to Adjib (Redford 1986: 21; Lundström 2021). The sequence, here arranged from older to more recent, reads: Sneferu, Khufu, Djedefra, Khafre, Userkaf, Sahure, Neferirkare, Shepsekare, Neferefra, Menkauhor, Djedkara, Unas, Teti, Pepi I, Nemtiemsef I and Pepi II (Lundström 2021). Five spaces exist between Khafre and Userkaf, but the names have not been preserved. Aside from the fact it is organized in reverse, the Saqqara King List parallels the Abydos King Lists of Seti I and Ramses II. It includes only the pharaohs' names and not reign lengths or political affiliations. There are, however, some differences between the lists. The Saqqara King List includes Shepsekare and excludes Niuserre, while the Abydos King Lists include Niuserre but exclude Shepsekare. The Saqqara King List also excludes Userkare and the last two rulers of the 6th Dynasty (i.e. Nemtiemsef II, Neitqirti). The number of kings per dynasty also differs between the two lists. The Saqqara King List likely contained nine 4th Dynasty rulers and four 6th Dynasty rulers (Lundström 2021). The Abydos King Lists contains six 4th Dynasty pharaohs and seven 6th Dynasty pharaohs (Lundström 2021). The reason for these discrepancies is unclear. Lundström (2021) has suggested the Old Kingdom records used to create these king lists were damaged and incomplete and required interpretation by the later New Kingdom scribes who compiled the lists. It is equally likely the New Kingdom scribes had access to different, original sources for Old Kingdom political succession and used these different records to construct the Saqqara and Abydos lists.

1.1.5 Manetho's *Aegyptiaca*

Manetho's *Aegyptiaca* is a very late source, which, like the other king lists, must be used with caution. The author's original history (c. 300 bce) is lost; however, sections of it are preserved in the writings of Josephus (*Contra Apionem*, 1st c. ce), Africanus (*Chronographai*¹², 3rd c. ce), Eusebius (*Chronicon*, 4th c. ce) and Syncellus (*Ecloga Chronigraphica*, 8th c. ce) (Hornung et al, 2006: 35). Manetho appears to have been a priest in Sebennytos in Lower Egypt during the 3rd c. bce (e.g. Dillery 1999: 93; Verbrugghe and Wickersham 2003: 96; Schneider 2012: 1; Gundacker 2015: 78). His *Aegyptiaca* is a three-volume history of ancient Egypt, and it situates the names, reign lengths and origins of the country's rulers within a narrative of historic events. Starting with gods, demi-gods and spirits of the dead who ruled Egypt, he describes kings who are grouped into 11 dynasties (Verbrugghe and Wickersham 2001: 99). The names, reign lengths and origins for most kings of Dynasties 1-6 and 11 are recorded: Africanus records eight pharaohs of the 4th Dynasty: Soris (Sneferu), Suphis I (Khufu), Suphis II (Khafre), Mencheres (Menkaure), Ratoises (Djedefra?), Bucheris, Sebercheres (Shepsekaf) and Thamphthis (Waddell 1940: 45, 47). Eusebius' notes suggest 17 kings comprise the 4th Dynasty but only identify Suphis II (Waddell 1940: 49). Africanus also records nine pharaohs of the 5th Dynasty: Usercheres (Userkaf), Sephres (Sahure), Nephercheres (Neferirkare), Sisires (Shepsekare), Cheres (Raneferef), Rathures (Niuserre), Mencheres (Menkauhor), Tancheres (Djedkare) and Onnus (Unas) (Waddell 1940: 51). Eusebius documents 31 pharaohs of the 5th Dynasty but only identifies Othoes (1st king) and Phiops (4th king) (Waddell 1940: 51, 53). Africanus records six pharaohs of the 6th Dynasty: Othoes (Teti), Phius (Pepi I), Methusuphis (Nemtiemsef I),

¹² Africanus' original *Chronographai* has also been lost; however, translations of it are preserved in Eusebius' and Syncellus' works.

Phiops (Pepi II), Menthusuphis (Nemtiemsef II) and Nitocris¹³ (Waddell 1940: 53, 55).

Eusebius also names Nitocris but no other rulers (Waddell 1940: 55, 57). The lengths of some Old Kingdom reigns are recorded by authors quoting Manetho, but many fail to find confirmation in other sources.

Absolute dates for Egyptian chronology have been determined from texts that record the heliacal rising of the star Sirius (Schaefer 2000: 149; Shaw 2000: 9; Helck 2014). Sadly, however, there are no such records for the Old Kingdom. This means absolute dates cannot be obtained directly, and they have to be extrapolated from the Middle Kingdom and New Kingdom references (Kitchen 1991: 205-206). These do, however, offer a guide for the Old Kingdom that can be refined with data from other sources.

1.2 Old Kingdom Political Chronologies

Relative chronologies are used to date archaeological and historical finds and to frame these within specific, political-historical contexts. In order to provide a chronological framework against which I can base my analysis of the archaeological data at the heart of this thesis, I consider three relatively recent attempts to build a chronology for the Old Kingdom.

Ian Shaw (2000) reconstructs a temporal framework for the 4th, 5th and 6th Dynasties (see table 1.1). He suggests the probable margin of error is 50 years for the Old Kingdom due to the need to extrapolate these older dates from New Kingdom data (Shaw 2000: 84). In an attempt to date the Giza pyramids more accurately, Kate Spence (2000) used the pyramids'

¹³ Nitocris has been identified with alternatively Queen Netiqerty of the 6th Dynasty (Newberry 1943) or King Neferkare Siptah Neithiqerty of the 8th Dynasty (Ryholt 2000; Baud 2010: 65-66) and is always considered the last ruler of the dynasty.

astronomical orientations and the known transit routes of two circumpolar stars to determine when they were constructed and by extrapolation when each king responsible for them reigned. She concludes that her date for the Great Pyramid at Giza is accurate to within five years (see table 1.2) and she argues that this serves as an anchor for chronologies of the 4th, 5th and 6th Dynasties (2000: 324), minimizing the typically larger margin of error for Old Kingdom dates.

Adopting a broader approach, drawing on the evidence provided by a wide range of sources, not least the king lists detailed above, the *Ancient Egyptian Chronology* project (Hornung et al, 2006) produced results which varied from those of the reconstructions of Shaw and Spence; the accession dates of kings differ by significant numbers of years. This divergence can be illustrated by the accession dates of Sneferu and Neferirkare. Shaw's chronology indicates Sneferu came to power in 2613 bce (Shaw 2000: 482), Spence places the accession date in 2526 bce (Spence 2000), and the Ancient Egyptian Chronology project places it in 2543 bce (Hornung et al, 2006). Similarly, Neferirkare came to power either in 2457 bce (Shaw 2000), 2359 bce (Spence 2000) or 2415 bce (Hornung et al, 2006). This results in differences that can be described as 'high' and low' chronologies. Recent work with radiocarbon dating, however, supports a high chronology (Dee 2013a: 215), and partly on that basis, I have adopted Shaw's chronology for this thesis. Perhaps the most significant differences among these three chronologies, however, are in their reconstructions of the sequence of some of the rulers. Thus, Hornung et al (2006: 491) insert Bikheris between Djedefra and Khafre in the 4th Dynasty, but neither Shaw nor Spence includes this enigmatic king in their chronologies. Additionally, Hornung et al (2006: 491) place Raneferef before Shepsekare, but Shaw (2000: 482) places this king after Shepsekare. Spence does not include either of these pharaohs in her chronology.

1.3 Evidence for Site Chronologies: Pottery Mound

Nolan (2010) was able to accurately and precisely date Pottery Mound because inscriptions found on sealings excavated in this area bear the Horus names of Khafre (*Hr wsr-ib*: Horus, Strong-hearted) and Menkaure (*Hr kꜣ-ḥ.t*: Horus, Bull-bodied) enclosed in *serekhs*. A *serekh* is the typical form of the king's Horus name, consisting of a niched façade and a rectangular or square space, in which the king's name is written in hieroglyphs, surmounted by a falcon (O'Brien 1996: 123). The niched façade and upper space are often interpreted as parts of the same royal building or structure (e.g. palace, tomb, or false door), and the falcon is interpreted as Horus (O'Brien 1996: 123). This form is the most common version of the Horus name; however, *serekhs* are sometimes topped with two Horus falcons, the Horus-falcon and the Seth-animal or by nothing (O'Brien 1996: 123). The falcon may also be shown wearing the red crown of Lower Egypt, the white crown of Upper Egypt or the double crown or holding various implements (O'Brien 1996: 123). A *serekh* is also occasionally surmounted by the Seth-animal alone (i.e. no falcon) (O'Brien 1996: 123). This indicates the pharaoh had a Seth name rather than, or in addition to, a Horus name.

Horus names inside *serekhs*¹⁴ can be used to date sealings from the Old Kingdom because the names refer to the reigning king (Nolan 2010: 32). This means the identified ruler was alive when the original seal (i.e. the seal that made the impression on the sealing) was made and used (Nolan 2010: 35-36). For example, a sealing bearing an impression with Khafre's Horus name indicates the originating seal was made and used during Khafre's reign.

¹⁴ Horus names lacking a *serekh* refer to a previous (i.e. dead) king (Nolan 2010: 32-33). Examples of this include the Horus names used in royal funerary cults and estates (Nolan 2010: 35).

This indicates the sealings excavated at Pottery Mound functioned during Khafre's and Menkaure's reigns.

Despite the certainty of when the sealings were made and used, when they were dumped remains a question. Sealings can be used to secure a container long after their originating seals are discarded. This means a sealing bearing Khafre's Horus name might be used to secure a storage jar that is not opened again until well into Menkaure's reign if it were placed in an archive or magazine. Sealings can also be used to temporarily close a container and then dumped almost immediately. This means a sealing bearing Khafre's Horus name might also be put in the trash during his reign. A review of the archaeology and phasing of Pottery Mound and surrounding sites in the next chapter will suggest when these sealings were dumped.

1.4 Giza Chronology

The archaeological remains at Giza can be dated using inscriptional, ceramic and scientific evidence excavated on site. The inscriptions (1.5.a), ceramics (1.5.b) and scientific (1.5.c) data for sites excavated at Giza (i.e. Heit el-Ghurob, Khentkawes Town and Silo Building Complex, Menkaure's Valley Temple, Gebel el-Quibli and the Pyramids) are treated in the following sections.

1.4.1 Inscriptions

Old Kingdom inscriptions with a king's Horus name can date sites to the specific ruler's reign when they have been excavated in secure, archaeological contexts (section 1.3).

Khafre's and Menkaure's Horus names were found on many sealings excavated in Heit el-Ghurob (Nolan 2007a, 2007b, 2010) and indicate it functioned during the mid-4th Dynasty. Userkaf's Horus name was also found on a few sealings (Murray 2011: 165), and this suggests the site was active for a short time at the beginning of the 5th Dynasty.

Menkaure's, Userkaf's, Sahure's, Neferirkare's, Raneferef's and Niuserre's Horus names were identified on sealings excavated in Khentkawes Town and Silo Building Complex (Nolan 2013: 13; AR 2014: 8). These discoveries indicate the sites functioned during the later 4th through mid-5th Dynasties.

Khafre's, Menkaure's, Shepsekaf's, Niuserre's, Isesi's, Teti's and Pepi's Horus names were found on sealings excavated in Menkaure's Valley Temple (AR 2011: 12; Nolan 2012: 3). These names suggest Menkaure's Valley Temple was originally active in the late 4th Dynasty and again in the late 5th and early 6th Dynasties (Nolan 2012: 3).

Finally, Khufu's and Khafre's Horus names were identified on sealings excavated in Gebel el-Quibli (Lehner et al, 2018). These discoveries indicate Gebel el-Quibli was active during the early 4th Dynasty.

1.4.2 Ceramics

A variety of pottery forms were excavated at Heit el-Ghurob: conical bread molds (see fig. 1.4), flat bread trays (see fig. 1.5), white carinated bowls (see fig. 1.6), red carinated bowls¹⁵ (see fig. 1.7), bowls with internal ledges (see fig. 1.8) and beer jars (see fig. 1.9)

¹⁵ These are more commonly known as Meydum bowls (Wodzinska 2007c: 319).

(Wodzinska 2007c: 319). These specific forms indicate Heit el-Ghurob functioned during the 4th Dynasty (Wodzinska 2007a: 143; 2007c: 283).

The ceramic forms excavated in Khentkawes Town and Silo Building Complex suggest these sites were active in the 4th Dynasty (Wodzinska 2011: 173-174, 177-178; AR 2013-2014: 6). Additional forms excavated in Khentkawes Town indicate the town continued to function during the 5th and 6th Dynasties (Wodzinska 2011: 173). Deposits with nearly complete, miniature ceramic vessels (e.g. plates, jars), beer jars and bread basins also suggest the Old Kingdom (Wodzinska 2011: 174; Marchand and Baud 1996). The majority of pottery excavated in this area belongs the 4th and 5th Dynasties (Wodzinska 2011: 173-174).

Reisner (1931: 202-229) excavated a large number of pottery sherds and ceramic vessels in Menkaure's Valley Temple. One group of ceramics suggests a late 4th-early 5th Dynasty date because the ceramics' forms are similar to forms excavated in mastaba tombs known to be from this period (Reisner 1931: 202-205). A second group suggests a late 5th-early 6th Dynasty date also because the pottery forms compare favorably with those excavated in mastabas known from this period (Reisner 1931: 205). These dates support the dates indicated by the sealings excavated in Menkaure Valley Temple and the idea the temple was occupied first during the time of its building (during and after Menkaure's reign) and re-occupied at the end of the Old Kingdom.

1.4.3 Scientific Data

In 1984 and 1995, Lehner and his team (1999) collected samples from the Great Pyramid of Khufu for radiocarbon dating. These samples were taken from charcoal that had

been mixed in with other materials to make the mortar that bound together the limestone blocks on the interior of the pyramid (Lehner 1999: 29). The laboratories where the charcoal was tested were able to obtain 28 dates from the samples: 20 from the 1984 collection and 18 from the 1995 collection (Lehner 1999: 31). The 1984 dates produced an average age of 2917 bce for the Great Pyramid, and the 1995 dates produced an average age of 2694 bce (Lehner 1999: 31). Both dates were surprising because they are roughly 400 to 100 years older than when Khufu was supposed to have reigned, but this is likely to do with the age of the wood taken for the samples. Ancient Egyptian builders frequently used older materials to construct the pyramids and other monuments; therefore, it is possible the wood tested was actually older than the Great Pyramid (Lehner 1999: 31).

Chapter 2: The Archaeology of Pottery Mound and Giza

This chapter examines the archaeology of Giza as it relates to administrative activity during the Old Kingdom. I briefly discuss the natural environment and its impact on Giza's development as a royal funerary site (section 2.1) and then consider the archaeological evidence for administration (sections 2.2-2.11).

2.1 Giza and Its Environs

Giza is located southwest of modern Cairo, on the opposite bank of the Nile and directly north of Abusir and Saqqara in Lower Egypt (see map 2.1). It became a prominent burial ground for rulers and elites in the Old Kingdom due to its location along the river near the apex of the delta. The Nile flood supplied the valley with cultivatable land by bringing new sediments and silts¹⁶ to the surrounding desert annually in the late summer and autumn (Lehner 2014; Lehner and Hawass 2017: 37). This flooding season was known as *Akhet* in ancient Egyptian (Lehner and Hawass 2017: 38). Crops were planted in *Peret*, the following season, and harvested in *Shemu*, the third and final season (Lehner and Hawass 2017: 39). The Nile floods resulted in natural basins and levees. Natural basins were called “basins of the pharaoh,” and they were adapted as ports for transporting materials, goods and people for pyramid building (Lehner 2014; Lehner and Hawass 2017: 38).

¹⁶ Sediment and radiocarbon studies indicate the Egyptian landscape transitioned from a wetter grassland with acacia trees and fowl to a drier desert in the middle of the Old Kingdom, during or just after the pyramids were built (Lehner and Hawass 2017: 39).

In addition, large quantities of limestone could be quarried at Giza (Lehner and Hawass 2017: 42). The land on which the pyramids were built is called the Mokattam Formation. The Mokattam Formation is a raised plateau comprised of thick layers of limestone interspersed with thin layers of marl and shale, and it is millions of years old (El-Souhby et al, 2004). Over seven million cubits of limestone were used in the construction of the pyramid complexes and other monuments on the Giza Plateau, and they were all obtained from the Mokattam Formation (Lehner and Hawass 2017: 42).

2.2 The Pyramids and Associated Structures

Three well-known pyramid complexes dominate the Giza plateau (map 2.2). They belong to the 4th Dynasty kings Khufu, Khafre and Menkaure and consist of the following elements: a pyramid, upper temple, pyramid court and enclosure wall, causeway, valley temple and queens' satellite pyramids (Petrie 1883; Reisner 1931; Junker 1951; 1953; Hassan 1953; 1960; Vyse 2014; Lehner and Hawass 2017: 140-281). Each pyramid complex also contains unique elements (e.g. Khufu's boat pits, Khafre's Sphinx and Menkaure's valley temple annex). These elements, and the differences in the pyramids' sizes, distinguish each complex and highlight each king's power to control both human and material resources through administration in order to succeed in both this life and the afterlife.

2.3 Khentkawes I Funerary Complex

Khentkawes I was an enigmatic¹⁷ queen who lived at the end of the 4th Dynasty, and her funerary complex is another remarkable feature of the Giza plateau. It is located directly north of Menkaure's Valley Temple and occupies the central area of the royal quarries (see maps 2.2). Khentkawes I's monument consists of a large and roughly square bedrock pedestal, an underground complex set of burial chambers and corridors, a chapel, a mastaba, a terrace, a boat pit, an enclosure wall and a water tank (Lehner 2015a; Lehner and Hawass 2017: 289-305). The underground complex and chapel were cut directly into the bedrock, whereas, the mastabas and terrace were constructed on top of the bedrock platform (Lehner 2015a; Lehner and Hawass 2017: 302). The enclosure wall, boat pit and water tank were all built separately from, but still associated with, Khentkawes I's monument (Lehner and Hawass 2017: 304). The enclosure wall encircles the entire monument but leaves spaces for the boat pit in the southwest corner and the water tank in the northeast corner (Lehner and Hawass 2017: 304-305).

The remaining portion of the Khentkawes I's Funerary Complex lies east of the tomb structure (see map 2.3). A settlement dubbed "Khentkawes Town" (hereafter KKT) was built adjacent to the tomb and surrounded by a thick enclosure wall (Lehner 2015a: 242). The town is roughly L-shaped and consists of ten large homes connected by streets and

¹⁷ Khentkawes I's relationship with the pharaohs buried at Giza and the royal family remains a mystery. The title *mwt ny-sw.t bity ny-sw.t bity* was inscribed on a stone door lintel at the entrance to her tomb (Lehner and Hawass 2017: 287). It has been translated as either "Mother of the Two Kings of Upper and Lower Egypt" or "Mother of the King of Upper and Lower Egypt, King of Upper and Lower Egypt," the former indicating she ruled as king in her own right (Lehner and Hawass 2017: 287). Complicating the identity of this queen was the discovery of two monuments at Abusir bearing the name Khentkawes, one of which also was inscribed with the same "mother" titles (Lehner and Hawass 2017: 287). These queens have since been identified as Khentkawes II, wife of the 5th Dynasty pharaoh Neferirkare and mother of the pharaoh Niuserre, and Khentkawes III, probable wife of the 5th Dynasty pharaoh Raneferef (Lehner and Hawass 2017: 287).

surrounded by the aforementioned enclosure wall (Tavares, Mahmoud and Shehab 2012: 23). House E was fully excavated by the AERA team, and they discovered short-legged beds, chairs, tables, stands, stools and mats (Tavares, Mahmoud, and Shehab 2012: 23). This suggests the area was used as living quarters for those ancient Egyptians who worked on Khentkawes I's monument and performed duties for her cult (Tavares, Mahmoud and Shehab 2012: 20). A terraced basin, presumably used as a port for on- and off-loading supplies employed in the construction of the monument complex, surrounded by an enclosure wall, was also excavated to the east of the town (Lehner and Hawass 2017: 306-311). This further indicates KKT functioned as a workspace for the priests and their staff who served the queen's cult (Tavares, Mahmoud and Shehab 2012: 20).

2.4 Silo Building Complex

The Silo Building Complex (hereafter SBC) abuts the Khentkawes I Funerary Complex along the Basin Enclosure Wall on the east (see map 2.4). It is comprised of a central administrative area surrounded by smaller rooms for baking, brewing and storage (AR 2012: 7, Lehner et al, 2012: 8). Several silos and peg-and-string sealings were excavated in the outer rooms (Lehner et al, 2012: 8-9). The silos likely functioned as granaries for the storage of emmer wheat and barley, and the peg-and-string sealings have been interpreted as locks for the granaries (Lehner et al, 2012: 8). Bread molds, beer jars and ashy deposits were also excavated in these rooms and indicate a production environment (Lehner et al, 2012: 8).

The SBC was built against the Basin Enclosure Wall, but further excavation revealed it was set into an older complex (Lehner et al, 2012: 7-9; Lehner 2015a: 237). Excavations in this area are ongoing and have not produced anything definitive to explain the relationship

between the older and younger structures (Lehner et al, 2012: 8-9). Analysis of the pottery and sealings excavated in the SBC indicate it was likely occupied during the 4th-5th Dynasty (Lehner et al, 2012: 8; Nolan 2013).

2.5 Eastern and Western Cemeteries

Several large cemeteries have also been excavated on the Giza plateau: the Eastern Cemetery, the Western Cemetery and several smaller clusters of tombs. The Eastern Cemetery lies east of Khufu's pyramid and consists of 19 mastaba-tombs (including four twin mastaba-tombs in which substructures connect two mastabas) built during the reigns of Khufu and Khafre (Reisner 1942: 15-16; Lehner and Hawass 2017: 315, 319). It is home to a particularly large mastaba, G7510, built for the Pharaoh Khufu's half-brother Ankhaf, as well as to several other mastabas for the king's other relatives including his mother, queens and children (Reisner 1942: 16; Flentye 2007; Lehner and Hassan 2017: 315).

The Western Cemetery sits west of Khufu's pyramid and consists of mastabas built for high officials during the reigns of Khufu and Khafre (Reisner 1942: 13-14; Lehner and Hawass 2017: 318-320). The Western Cemetery is divided into four sections: G1200, G2100, G4000 and the Cemetery en Echelon. G1200 contains the tomb of Wepemnefret (G1201), Master of Scribes of Architectural Projects, in addition to eleven smaller mastabas for other royal workers (Reisner 1942: 13; Lehner and Hawass 2017: 316, 319). G2100 contains two very large and anonymous tombs, G2210 and G2200, as well as ten smaller mastabas for palace officials (Reisner 1942: 13; Lehner and Hawass 2017: 316, 319). G4000 contains the largest mastaba to be excavated at Giza, G4000, built for Hemiunu, and 41 smaller mastabas (Reisner 1942: 13; Lehner and Hawass 2017: 318). Cemetery en Echelon is located in the

eastern portion of the Western Cemetery and consists of 25 average size mastabas, many of which remained unoccupied for nearly 100 years (Reisner 1942: 13; Lehner and Hawass 2017: 319). The Western Cemetery appears to have been originally intended as the burial place for Khufu's high officials. Many of these people worked at the highest levels in the administration, and their importance to the rule of Egypt is underscored by their internments near the king¹⁸.

Several clusters of rock-cut tombs have also been excavated in Central Field East and West, Khafre's Western Terrace, the escarpment east of the Eastern Cemetery, the northern edge of the quarry located southeast of Menkaure's pyramid and the natural cliff northeast of the Western Cemetery (Reisner 1942; Lehner and Hawass 2017: 321).

2.6 Workers' Cemetery

The Workers' Cemetery lies on a slope in the southwestern part of the Giza Plateau (map 2.5). The Workers' Cemetery has been divided into a Lower Cemetery and an Upper Cemetery, both of which consist of larger tombs surrounded by smaller tombs (Hawass and Senussi 2008: 16). The Lower Cemetery lies on the lower slope and consists of large and small tombs for lower-ranking laborers and their families (Hawass and Senussi 2008: 16-17). The Upper Cemetery lies on the higher slope and contains the tombs of specialist craftsmen and administrators, as well as those of their support staff and families (Hawass and Senussi 2008: 17-18). Some of the administrative positions occupied by those buried in this portion of the Workers' Cemetery include Director of the Draftsmen, Inspector of the Craftsmen, and

¹⁸ As far as I am aware, no one has studied the spatial arrangement of administrators' burials on the Giza necropolis. What patterns might be seen could shed further light on hierarchy and position within Old Kingdom Egypt's government.

Overseer of the Harbor, indicating these people worked in the vicinity and as part of the pyramid-building projects (Lehner and Hawass 2017: 346). The additional titles Overseer of the Side of the Pyramid and Inspector of Dragging Stones further indicate some people worked directly on the pyramids for the king (Lehner and Hawass 2017: 346). The ceramic and tomb evidence, as well as the layout of the cemetery in relation to other areas on the Giza Plateau, indicate the Worker's Cemetery functioned from the early 4th Dynasty through the end of the 5th Dynasty (Hawass and Senussi 2008: 17, 18; Lehner and Hawass 2017: 352-353).

2.7 Area C

Area C lies due west of Khafre's Pyramid on the Giza plateau (see map 2.2). Petrie (1883) first excavated it in the late 19th century, and AERA (Conrad and Lehner 2001) returned to the site in the 1980's. Area C is 450m long (north-south) and 80m wide (east-west), and it consists of 93 interior galleries and an open space (Lehner and Hawass 2017: 361). Each gallery roughly measures 30m long and 3m wide, and the open space measures 50m wide (Lehner and Hawass 2017: 361). Area C is currently interpreted as a site for the storage and production of royal crafts (Lehner and Hawass 2017: 363). The copper, malachite ore, unworked feldspar, small flints, diorite pounders, pieces of granite, dolorite, quartzite and basalt, statue fragments and expertly carved limestone figures of humans and lions excavated within Area C support this conclusion (Lehner and Hawass 2017: 362-363). Material and stylistic parallels between statues excavated in Area C and in the Sphinx Temple and Khafre's Upper Temple (Lehner and Hawass 2017: 363) suggest this workshop operated during the reign of Khafre and at the same time as areas of the Heit el-Ghurob.

2.8 Abd el-Aziz Settlement

The Abd el-Aziz settlement, named for its excavator Abd el-Aziz Saleh (1974), lies southeast of Menkaure's Pyramid and sits in the southeast corner of Menkaure's second enclosure wall (see map 2.6). It is comprised of an open area and three sets of double galleries, each 25m long, along its northern wall (Lehner and Hawass 2017: 363). Pieces of alabaster and a row of horseshoe-shaped hearths were excavated in the open area, leading excavators to interpret this part of the settlement as a production space (Lehner and Hawass 2017: 363). Other evidence (e.g. ovens, ceramics, red granite chunks) indicates people lived and worked in the backs of the galleries (Lehner and Hawass 2017: 363-364). Both the alabaster and the red granite were used in pyramid construction, and they suggest the people who worked in the Abd el-Aziz Settlement built the pyramids (Abd el-Aziz 2015: 89-92).

2.9 Heit el-Ghurob

The Heit el-Ghurob (hereafter HeG) sits in the southeast corner of the Giza plateau. It is separated from the Menkaure Valley Temple and Khentkawes I Funerary Complex by modern Muslim and Coptic cemeteries, and it extends beneath the modern village of Kafr Gebel in the west and the Abu el-Hol Soccer Field in the south. The full extent of the site is unknown because the excavators are not allowed to excavate beneath these modern structures, but the team from AERA has mapped seven hectares of it and excavated about ten percent of the mapped area (Lehner 2015b: 401, 404). The HeG is named for its most distinguishing feature: the Heit el-Ghurob, which translates to Wall of the Crow (Lehner 2015b: 289). Wall of the Crow is a 200m long stone wall, 10m thick and 10m high, that runs east from the south side of the Central Wadi, and it functions as the northern border of the

settlement (Lehner 2015b: 398). A gate, measuring 7m high and 2.60m wide, was excavated in the area roughly approximating the wall's center (Lehner 2007: 8). A 2m wide fieldstone wall extends south of Wall of the Crow for 148m until it curves southeast and finally east through the HeG (Lehner 2007: 13). The wall, called Enclosure Wall, frames a significant portion of the HeG settlement (Lehner 2007: 13).

Archaeological and textual evidence suggests the HeG functioned as a town where men and women, who built and supplied Khafre's and Menkaure's pyramids, worked and lived as well as an inland harbor for the Egyptian state (Lehner 2013: 2-7; Lehner 2015b: 398, 401). The town is divided into several different sections: Gallery Complex, Western Extension, Western and Eastern Compounds, East of Galleries, Eastern Town, Royal Administrative Building and Western Town (see map 2.7).

2.9.1 Gallery Complex

The Gallery Complex (see map 2.8) lies south of Wall of the Crow and in the north-central section of the Heit el-Ghurob (see map 2.7). It consists of four units called gallery sets and labelled Gallery Set I, Gallery Set II, Gallery Set III and Gallery Set IV (Lehner 2015b: 404). Each Gallery Set¹⁹ contains 8-9 long rooms, called galleries, running north to south (Lehner 2015b: 404). Most Gallery Sets are separated by relatively broad streets: North Street lies between Gallery Sets I and II; Main Street lies between Gallery Sets II and III; and South Street lies on the exterior of the southern wall of Gallery Set IV (see map 2.8). These streets

¹⁹ Gallery Set I does not appear to have 8-9 rooms in the map because much of its northern and eastern walls have been eroded over time; however, the architectural consistency observed in the other three, Gallery Sets has convinced the AERA team of the similarity in structure of these buildings (Lehner and Hawass 2017: 381).

run east-west and are 5.2m across (north-south), and they provide access to other parts of the HeG (Lehner 2015b: 404). Square-like structures were also excavated outside the western walls of Gallery Sets II, III and IV (see map 2.8). These have been called Gatehouses and have been interpreted as living and working spaces for the guards who controlled access to each Gallery Set (Lehner 2015b: 404).

The AERA fully excavated Gallery III.4 and found low, sloping platforms, several hearths, broken ceramics and animal bones (Lehner 2015b: 407; Lehner 2007: 188; Abd el-Aziz 2007: 194, fig. 8.1 and 198, fig. 8.6). The platforms are similar in structure and construction to others excavated elsewhere in Egypt (Lehner 2015b: 47). They have been interpreted as beds and, together with the other evidence, suggest these galleries functioned as living quarters (Lehner 2015b: 47). Two additional square structures were excavated in the southeastern corners of Gallery Sets II and III (Lehner 2015b: 404). Both the architecture and artifacts suggest the Gallery Sets served as barracks with as many as 40-50 people sleeping in the long rooms and several overseers sleeping in the square rooms (Lehner 2015b: 404).

2.9.2 Western Extension

The Western Extension is a series of walls and courtyards located in the northwest section of the HeG and directly west of the Main Street Gatehouse and Gallery Set III (see map 2.7). Excavations in the north section revealed a series of walls, a courtyard, and an opening in Main Street's southern wall: this area apparently functioned as the Western Extension's northern border (Lehner 2002: 54). The opening presumably allowed people to enter the complex, which has been interpreted as a small house with storage chambers, from Main Street (Lehner 2002: 57). Further excavations in the southeast section uncovered a

series of 3 chambers, 3m east-west (Lehner 2002: 54). A hearth, an ashy layer and a *taffla* surface were excavated in the southern room, suggesting this building was a home with areas for cooking and storage (Lehner 2002: 54, 57). The excavators also uncovered a large amount of mudbrick rubble beneath limestone rubble: the former apparently fell onto the latter (Lehner 2002: 54). Their findings suggest the walls were originally constructed with two materials: limestone for the base layer and mudbrick for the top layer (Lehner 2002: 54). Palm logs, sticks and reeds were also excavated in the southern building, indicating the building had a roof (Lehner 2002: 54). Structures of similar construction and arrangement were also excavated in the settlement southeast of Menkaure's Pyramid and in the 4th Dynasty workers' town in the Wadi Gerawi, and this evidence supports the AERA team's original interpretation of their findings as small houses and storage magazines (Lehner 2002: 57).

2.9.3 Western Compound

The Western Compound lies in the northwest corner of the HeG but outside the Enclosure Wall (see map 2.7). It is rectangular, oriented northwest-southeast and comprised of a large open space with a series of walls. The AERA team has excavated several trenches in the Western Compound; however, its purpose and stratigraphic relationship to other areas of HeG (mainly the Eastern Compound and The Chute) remain a mystery (Taylor 2011: 121). A burial from the early 4th Dynasty was also excavated in the Western Compound (Kaiser 2011: 193). It is the only Old Kingdom burial excavated north of Main Street; however, Kaiser (2011: 193) believes she has detected other earlier burials beneath the Late Period burials also excavated in this area. The burial contained the skeleton of an adult male with the crown of the head facing north and the body curled into the fetal position lying on its right

side, suggesting this was a non-elite man (Kaiser 2011: 193). Traces of reed matting were also excavated, but the burial contained no grave goods (Kaiser 2011: 193). The burial predates the structures in the Western Compound, and it has been interpreted as the burial of someone who lived (and died) in the Gallery Complex (Kaiser 2011: 193).

2.9.4 The Chute

The Chute is located south of the Western Compound (see map 2.7). It is defined by two parallel fieldstone walls that run from the northwest to the southeast and towards the Western Gatehouse, through the Enclosure Wall and onto Main Street (see map 3.7). Large numbers of cattle, sheep and goat bones were excavated in the chute, and this evidence indicates it functioned as a pen used to corral animals (Lehner 2009: 99).

2.9.5 Eastern Compound

The Eastern Compound lies east of the Enclosure Wall and is located between the Enclosure Wall, Gallery Set I and the North Street Gatehouse (see map 2.7). The remains of a series of walls, which partition the area into four north-south sections 11.2 to 12.0 meters wide, were excavated in the northern part of the Eastern Compound (Lehner 2011: 95). A series of small chambers, hearths and a bakery were also excavated in the northern section of the western partition (Lehner 2011: 95).

The rest of the Eastern Compound is comprised of a large, open space, similar to the Western Compound, and filled with a thick layer of gritty sand that appears to have been intentionally deposited during the Old Kingdom (Lehner 2011: 95). This surface is more or

less level with the layer of gritty sand observed in the Western Compound and higher than the rest of HeG, indicating this area was built somewhat later than the rest of the town (Lehner 2011: 95). Numerous Late Period burials have been excavated in this area; however, no evidence of Old Kingdom burials has been excavated (Lehner 2011: 95).

2.9.6 East of Galleries

East of Galleries (hereafter EOG) lies between Gallery Complex and Eastern Town and between Main Street and South Street (see map 2.7). EOG has been interpreted as a large-scale, industrial and waste-dumping area (Lehner et al, 2009: 30). Egyptian authorities used a backhoe to partially excavate sections of EOG in the late 1980's. Thereafter, the AERA team took over and continued to excavate trenches dug by the backhoe and also started to dig new trenches elsewhere in EOG (Lehner et al, 2009: 30). The labelling system for excavated areas in EOG is based on the trenches the backhoe dug: for example, BHT stands for Backhoe Trench and BBHT stands for Biggest Backhoe Trench. EOG is comprised of several excavated areas: Big Backhoe Trench 1 (hereafter BBHT 1), Square 4.N24, Main Street East (hereafter MSE), Big Backhoe Trench 2 (hereafter BBHT2), East of Galleries/Backhoe Trench (hereafter EOG/BHT) and the Backhoe Trench: Hypostyle Hall (hereafter BHT: HH) (see map 2.9).

BBHT1 is one of the larger trenches dug by the backhoe and later excavated by the AERA team. It is north of the Main Street East, south of the floodplain and cuts partially into square 4.N24 (see map 2.9). The team from AERA excavated a series of walls and a large chunk of granite casing in the trench's northeast section (Lehner et al, 2009: 32). The granite

casing is more luxurious than the granite rubble excavated elsewhere in the HeG, and it indicates the presence of an important building (Lehner et al, 2009: 32).

Square 4.N24 is the result of expanded excavations on the BBHT1 by the AERA team. It lies east of the BBHT1 and south of the floodplain (see map 2.9). Square 4.N24 yielded two separate phases: an upper phase comprised of dissolved mudbrick and a lower phase comprised of several walls and other architectural elements (Lehner et al, 2009: 32-35). Abd el-Aziz, from AERA, excavated several layers of disturbed mudbrick in the upper phase (Lehner et al, 2009: 32). The bricks appear to have dissolved, during a period of flooding, and flowed around the area, creating sandy islands (Lehner et al, 2009: 32). Two large walls intersect and create four separate rooms in the lower phase (Lehner et al, 2009: 33-34). The two northern rooms were not excavated because they lay beyond the limit of AERA excavations (Lehner et al, 2009: 34). Several comparatively thick walls with plastered surfaces and a doorway were excavated in the southern rooms, suggesting this area might have been part of an elite town located in the northeast of HeG (Lehner et al, 2009: 35).

Main Street East forms the eastern boundary of Main Street's northern wall (see map 2.9). It is comprised of an upper phase, which contains "settlement sludge" similar to that observed in the upper phase of Square 4.N24, and a lower phase, which contains a series of walls, a curb and installations related to the production and storage of various materials (Lehner et al, 2009: 36-38). The AERA team excavated a large mudbrick wall on the north and south sides of Main Street's northern wall on Main Street's eastern extension (Lehner et al, 2009: 35). Eighteen meters of the wall have been excavated; however, the excavators believe it extended much further south (and perhaps north beneath the floodplain) and served as a barrier between EOG and Eastern Town (Lehner et al, 2009: 35). An opening excavated

in the wall's southern section supports this idea and indicates a space for entering and exiting the two areas (Lehner et al, 2009: 36). Running alongside the mudbrick wall on its western side is what the excavators called a "curb" (Lehner et al, 2009: 37). The curb is simply a low wall about one brick thick and ankle high (Lehner et al, 2009: 37). The function of this curb is currently unknown; however, curbs attached to walls were also excavated in the Gallery Complex (Lehner et al, 2009: 37) (see below). A series of 20 pedestals is located 65-75cm west of the mudbrick wall (and curb) and runs along the same north-south access (see map 2.9). Marl plaster was excavated on some of the pedestals, and a series of mudbrick and stone installations was excavated in the open spaces before and between the pedestals (Lehner et al, 2009: 38, 39). Excavators believe these installations also functioned as platforms for jars that collected liquids or other waste from the materials stored in the pedestals (Lehner et al, 2009: 40). The entire area has been interpreted as a storage and possibly production site within the greater industrial yard of EOG (Lehner et al, 2009: 40).

Big Backhoe Trench 2 cut into the area of EOG south of Main Street's eastern extension (see map 2.9). Excavators from AERA expanded excavations in the trench to include the entire area in the north of EOG south of Main Street and between MSE and the Eastern Town in the west and the Hypostyle Hall in the east (hereafter BBHT2) (see map 2.6). The AERA team excavated a series of chambers and installations in BBHT2: Rooms 1 and 3 in Enclosure A; Rooms 2 and 4 in Enclosure B; Enclosures C and D; and Room 5 (Lehner et al, 2009: 44-48). Room 3 in Enclosure A yielded two surfaces with twelve pits: four pits ran north-south along the eastern wall, three pits ran north-south along the western wall and two pits ran east-west along the northern wall (Lehner et al, 2009: 46). A layer of debris separated this surface from an upper surface, which contained three pits running north-south along the eastern wall right above the four pits from the lower layer (Lehner et al,

2009: 46). A similar pattern of installations and surfaces was observed in Room 4 (Lehner et al, 2009: 47). AERA excavators have interpreted the pits as areas for storing bread-baking ingredients (e.g. flour, malt, water) or as space for preparing grain and barley for baking in Enclosure D (Lehner et al, 2009: 47).

The AERA team excavated a bakery in Enclosure D (Lehner et al, 2009: 47). Significant numbers of bread molds and other ceramic fragments and several layers of ash were excavated throughout the entire area (Lehner et al, 2009: 47). A large ceramic vat was exposed in the eastern section of the enclosure, and a bin encased in marl brick was excavated in the southwest corner of the bakery's southern room (Lehner et al, 2009: 48). A series of baking pits with pot sockets was also dug along the western wall in the northern room, and a granite block resting on burned earth, which has been interpreted as a hearth, was excavated in the northwest corner (Lehner et al, 2009: 48).

The Backhoe Trench (hereafter EOG/BHT) cut into the southeast corner and eastern wall of the Hypostyle Hall and was expanded by the AERA team to include the area south and east of the Hypostyle Hall (see map 2.9). The bakeries south of the Hypostyle Hall are similar to the bakery described in Enclosure D and suggest baking occurred on an industrial scale for the large workforce living and working in the HeG and laboring on the pyramids (Lehner et al, 2009: 49).

Four east-west running rows of pedestals were excavated to the east of the bakeries and BHT: HH (see map 2.9). They are similar to the pedestals excavated in the MSE and elsewhere across the site, suggesting they performed a similar function (Lehner et al, 2009: 49). The actual space into which the backhoe dug is partitioned into east and west sides by a

thick mudbrick wall running north-south through the center (see map 2.8). Several layers of “pink stuff” (i.e. waste from pyro-activity and crushed pot sherds), a thick layer of bread molds and other pot sherds and two complete bread pots arranged in rectangular formation were excavated on the rooms’ east side (Lehner et al, 2009: 59). This room’s function is unclear; however, it has been alternatively interpreted as a dump for production occurring on the west side or as an area of production itself (Lehner et al, 2009: 49, 59). An upper phase of waste from industrial-scale bread production and a lower phase of faience production were excavated on the west side of the dividing wall (Lehner et al, 2009: 59). Evidence for faience production excavated on the west side includes finished faience products, small ceramics and quartz in various forms (Lehner et al, 2009: 49, 50).

The Backhoe Trench Hypostyle Hall sits east of Gallery Set III and west of BBHT2 (see map 2.9). The hall is approximately 15m x 25m and oriented north-south, and it is one of the oldest Hypostyle Halls excavated in Egypt (Lehner and Hawass 2017: 372). Three sets of three low, curved benches separated by narrow “troughs” or possibly drains run north-south across the length of the hall (Lehner 2009: 207, 222, figure 21). Series of column bases were excavated under each center trough: each column base measured roughly 23cm in diameter, and they are spaced 2.62m apart (Lehner et al, 2009: 207). The column bases likely supported narrow wooden columns, which in turn supported a roof (Lehner et al, 2009: 207). Significant numbers of fish bones and ceramic bowls were excavated in addition to the structures described, which suggests fish were either cleaned and prepared or perhaps eaten in this area (Lehner and Hawass: 2017: 373-374).

2.9.7 Eastern Town

Eastern Town is a large settlement located east and south of EOG (see map 2.7). Its full extent is unknown because it continues east under the modern towns of Nazlet es-Samman and Kafr Gebel (Lehner 2007: 15). The thick, north-south running wall excavated in MSE (described above) appears to have formed a border between the industrial area of EOG and the living quarters of Eastern Town (Lehner et al, 2009: 36). An opening in the southern section suggests access to the industrial area from Eastern Town was tightly controlled (Lehner et al, 2009: 36). Eastern Town consists of small rooms and courtyards arranged relatively haphazardly (Lehner 2007: 45). Lehner (2007: 45) notes the different movement patterns required of people walking around Eastern Town and the Gallery Complex: the people moved through Eastern Town more freely and more organically, and the people moved through the Gallery Complex more regimentally and rigidly because the architecture is different in these spaces. Small silos, plant remains, pig bones, grinding stones, querns and ashy deposits were excavated throughout Eastern Town and suggest this space functioned as living quarters for people who worked elsewhere in the HeG (Lehner 2007: 45).

2.9.8 Royal Administrative Building

The Royal Administrative Building (hereafter RAB) lies in the southeast section of Heit el-Ghurob and partially under the Abu el-Hol Sports Club Soccer Field (see map 2.7). A 2m thick rectangular enclosure wall made from broken limestone surrounds a courtyard and silos in the east and a series of chambers in the west (Murray 2011: 153). An earlier structure (see map 2.10) sits beneath this building: it consists of a group of small rooms (hereafter Western Buildings) in the northwest and an extension of the Eastern Town in the northeast

surrounded by a single mudbrick wall (Murray 2011: 153). Together, these two buildings comprise the RAB.

The RAB was deposited in nine phases. Phases 1-3 represent the construction and occupation of the earlier structure (Murray 2011: 157). The sealings, tools, craftwork and raw materials excavated in the Western Buildings indicate this area functioned as a workshop (Murray 2011: 157-158). A relatively small number of bread molds, beer jars, building tools, bead and bracelet fragments, wood charcoal and weed taxa were excavated in Eastern Town Extension, and they suggest this area also operated as a production site (Murray 2011: 159).

Phase 4 resulted from the demolition of the RAB's earlier structure and the construction of its second structure (Murray 2011: 159). The significant number of demolition tools (e.g. hammers, axes, pounders) and grinding implements (e.g. querns, anvils) support this assessment (Murray 2011: 159-160). Beer jars, bread molds, bread trays and animal bones suggest this area functioned as either a bakery or brewery and as a site for food consumption (Murray 2011: 160). The high number of cattle bones among the faunal debris also indicates the inhabitants were elite (Murray 2011: 160). A few sealings and sealing-related objects were also excavated in this phase, the earliest context at RAB with these objects. Their presence suggests administrative practice but on a small scale and perhaps associated with either the building activities or the inhabitation of the new structure.

Phases 5 and 6 were deposited after continued building and initial occupation of the second RAB complex (Murray 2011: 161). Many artifacts demonstrate weaving, whetting, and construction occurred in the area (Murray 2011: 161). They also indicate practices begun in earlier phases continued. Pigment, for example, was excavated in both phases in the

northwest corner of the site, directly above where it had been excavated in earlier phases, suggesting it was produced or used over an extended period of time at this site (Murray 2011: 162). The mudbrick used to construct the second RAB complex also suggests continued use and reuse because it was made with materials from the earlier structure, including sealings, ceramics and bone (Murray 2011: 162).

Additionally, the remains of what might be a kitchen were excavated in Room 6 in the northwest part of RAB (Murray 2011: 161). These remains include a hearth, next to which was placed a storage jar and pot emplacements (Murray 2011: 162). Animal bones excavated in this area and throughout the RAB (primarily in pits located in the courtyard) include significant amounts from sheep, goats and catfish, as well as small amounts from cattle (Murray 2011: 162). Murray (2011: 162) suggests this evidence indicates the people who worked in the second RAB complex were not elite.

Phase 7 resulted from the initial occupation of the second RAB structure (Murray 2011: 162). A hearth, baking pit depressions and a thick layer of ash with significant amounts of plant remains were excavated in chamber 8 (northwest corner) (Murray 2011: 162). Several pot emplacements were also excavated in the adjacent chamber 9 (Murray 2011: 163). The evidence from these two rooms indicates they likely functioned together as a bakery: room 8 was for baking and room 9 was for mixing (Murray 2011: 162). Bread molds and a thick layer of ash with a makeup similar to the ash layer excavated in chamber 8 were excavated in room 4, suggesting this area might also have functioned as a baking area (Murray 2011: 164).

Both knives and scrapers were excavated in the courtyard, suggesting both flint-knapping and tool-sharpening activities took place in this area (Murray 2011: 166).

Additional scrapers and several flakes were excavated in the Western Rooms, indicating these activities were common during this phase of occupation (Murray 2011: 166).

Cattle, pig and sheep bones, in addition to various types of bird and fish bones, were excavated in RAB (Murray 2011: 164). Once again, cattle bones were excavated in larger amounts than any other type of meat, suggesting the inhabitants were eating relatively well (Murray 2011: 164).

Phase 8 resulted from later stages of occupation (Murray 2011: 166). It is defined by the large amount of debris scattered across the courtyard and in part of the Western Rooms, which had been relatively well-contained in earlier phases. Much of the debris consisted of various tool types: those used in weaving (e.g. loom weights, bone needles, and spindle whorls) were particularly abundant (Murray 2011: 166). Pigment, jewelry, and gaming pieces were also excavated in the debris of the courtyard (Murray 2011: 166-167).

Cattle bones were again abundant; however, pig, sheep and goat bones as well as catfish bones were also excavated in relatively high numbers throughout the RAB (Murray 167). A significant number of plant remains was also excavated in the courtyard and chamber 1 (Murray 2011: 167). Murray (2011: 167) notes the plant remains excavated in room 1 were less fragmented than those excavated in the courtyard and suggests this means the latter were likely repeatedly disturbed after burial. Wood charcoal (mainly Nile acacia) and cereal processing remnants were also excavated in the courtyard (Murray 2011: 167).

Phase 9 resulted from the collapse or intentional destruction and abandonment of the second RAB complex (Murray 2011: 167). Artifacts of types similar to those excavated from previous phases were also excavated from this phase, in addition to statue fragments, a drill bit, gneiss and several calcite bowls (Murray 2011: 167). Murray (2011: 167) notes the latter evidence was excavated in the courtyard and might suggest it functioned as a designated drilling area during this phase.

Sheep, goat and fish bones, cereals and chaff were excavated in phase 9 (Murray 2011: 167-168). Murray (2011: 167-168) notes the latter were not very fragmented and suggests this indicates they were left undisturbed after dumping.

2.9.9 Area AA

Area AA is located in the southwest quadrant of Heit el-Ghurob (see map 2.7). It lies northwest of House Unit 1 and Pottery Mound (see below) and on the western edge of Western Town (see map 2.11). Area AA is comprised of three main sections: Pedestal Building, Northern Building and Transect B (Lehner et al, 2009: 65-77). The Pedestal Building is located in the southwest corner of Area AA (see map 2.12). The AERA team excavated it through several seasons and uncovered a rectangular building with walls made from stone, mud mortar and marl plaster (Lehner et al, 2009: 65). The building was divided by a central wall, 50cm thick, and two rows of rectangular pedestals running north-south, one on each side of the dividing wall: the western row contained eight pedestals and the eastern row contained six pedestals (Lehner et al, 2009: 65) (see map 2.11). A magazine composed of five short mudbrick walls and a thick fieldstone wall oriented east-west were also

excavated attached to the exterior of Pedestal Building's southern wall (Lehner et al, 2009: 66) (see map 2.11).

Early excavations yielded a passage (Corridor O) north of Pedestal Building (Lehner et al, 2009: 65). Later excavations revealed the corridor led to what became Northern Building (see map 2.12). The Northern Building is comprised of a series of rooms, the most distinctive of which are the Oven Room, the Bin Room, and the Long Room. The Oven Room is roughly square (3m x 3.2m), located directly north of Pedestal Building and accessible from Corridor O (see map 2.12). Two ovens and a layer of whitish wood ash were excavated in the Oven Room in addition to a "bricked-up" opening in the room's eastern wall that once led to the Bin Room (Lehner et al, 2009: 69-72). The Bin Room is a rectangular structure divided by a mudbrick wall into north and south sections: the north section was further divided into three small rooms, called bins by the excavators, and the south section remained an open corridor (Lehner et al, 2009: 72). The westernmost bin was further divided into north and south sections, the interior of the southern portion of which was plastered with pink gypsum (Lehner et al, 2009: 72). The Long Room lies north of the Oven Room, and an opening in the Long Room's south wall/Oven Room's northern wall connects the two rooms (Lehner et al, 2009: 73). A mud-paved floor, two curbs – like those excavated in the Gallery Complex and MSE – oriented north-south on the room's east and west walls were excavated in the Long Room (Lehner et al, 2009: 73). A burn spot was also excavated on the Long Room's southern wall next to the opening; however, the function of this room remains unclear (Lehner et al, 2009: 73).

In 2005, the AERA team expanded excavations of Area AA to include the area east of Pedestal Building (Lehner et al, 2009: 74). This area became known as Transect B, and a

series of several distinguishable rooms was excavated within its confines: the Limestone Threshold Room, the Basin Room and the Bakery (Lehner et al, 2009: 74-77). The Limestone Threshold Room is rectangular and lies in Transect B's northwest corner. An opening with a trapezoidal, limestone slab was excavated in the room's eastern wall (Lehner et al, 2009: 74). Two bread pots, 1 on each side, were excavated outside this opening, and a layer of dark grey ash and a surface of pottery fragments were excavated inside the room (Lehner et al, 2009: 74). The opening led into a small corridor located north of the Basin Room and Bakery (see map 2.12). A shallow basin with a hole in its center and lined with sandy silt was excavated in the center of the room (Lehner et al, 2009: 76). This structure has been interpreted as a vat for preparing dough that would be baked in the Bakery (Lehner et al, 2009: 76). The Bakery is a series of rooms located south of the Basin Room and in the southern section of Transect B. A hearth, baking pits, layers of grey ash and walls burned red were excavated in this area (Lehner et al, 2009: 76-77). The AERA team has interpreted Transect B as a production facility with restricted access based on the architectural layout of the rooms in the building (Lehner et al, 2009: 77).

2.9.10 House Unit 1

House Unit 1 (see map 3.13) sits in the central section of Western town (see map 2.11), and it is the largest house thus far excavated in HeG (Lehner 2011: 131). It is 400 sq. meters and comprised of 20 rooms, making it comparable with the "smaller elite houses" excavated in New Kingdom Amarna (Lehner 2011: 131; Lehner and Hawass 2017: 382). House Unit 1 consists of a domestic interior (i.e. sleeping and living quarters) surrounded by an occupational exterior (i.e. working and storing areas) (Lehner and Hawass 2017: 282). The two largest chambers are situated in the center of the house. The smaller room yielded a mud-

brick mastaba running along the interior of its southern and western walls as well as black paint and plaster at the bottom of each wall (Lehner and Hawass 2017: 283). The larger chamber yielded a “sloped bed platform with raised footboard” and fragments of “red-painted, molded, marl plaster” in its southwest corner (Lehner and Hawass 2017: 282). This area most likely functioned as the sleeping quarters of the house’s master (Lehner and Hawass 2017: 382). A small, irregularly-shaped room (10,788) lies southeast of this larger chamber (Kawae 2009: 89). Its southern wall is the southern border of House Unit 1, and it is partially covered by the Pottery Mound dump (Kawae 2009: 89, 90). The room’s western portion contained mudbrick tumble, red-painted plaster and charcoal in three distinct layers (Lehner et al, 2006: 70). Its eastern portion contained mud clumps with impressions of reed and rope in a layer of ashy sand (Lehner et al, 2006: 70). These types of mudbrick clumps have been excavated elsewhere in House Unit 1 and most likely indicate fallen or discarded roofing materials (Lehner et al, 2006: 70). A compact layer with mudbrick tumble and a sandy-soil layer with a few pot sherds, limestone fragments and faunal remains beneath it lie at the bottom of the room (Lehner et al, 2006: 70). These two layers most likely functioned in the Pre-Pottery Mound phase (Lehner et al, 2006: 70).

A bakery or brewing complex makes up the eastern portion of House Unit 1 (see map 2.13). It consists of 5 rooms: 1 large, rectangular room in the north, and 4 smaller, square rooms in the south (Sadarangani and Kawae 2011: 137). Several hearths, vats, pot emplacements and bins, in addition to ashy fills, were excavated in these rooms, suggesting this area functioned as either a bakery or brewery (Lehner and Hawass 2017: 283).

Sealings²⁰, pot sherds and animal bones were excavated in relatively level, ash-rich deposits in room 11,060 of the bakery/brewery area of House Unit 1 (Sadarangani and Kawae 2011: 140). The relatively level nature of the deposits indicates the ash and artifacts were dumped onto the room's previous surface while the room was still in use (Sadarangani and Kawae 2011: 140).

2.9.11 Pottery Mound

Pottery Mound lies south of House Unit 1 and between House Units 1 and 2 in the Western Town (see maps 2.11, 2.13). It fills an area bound by four mudbrick and fieldstone walls measuring 6.40m north-south and 11+m²¹ east-west (Lehner et al, 2006: 69). A series of pedestals, running east-west, was excavated in the western section of the enclosure and beneath the Pottery Mound (Lehner et al, 2006: 70-71). They align with a doorjamb in the enclosure's eastern wall and another set of six pedestals running east-west to the east and outside of the Pottery Mound enclosure (Lehner et al, 2006: 71). An additional set of six pedestals, running north-south across the six eastern pedestals, was also excavated in this area (Lehner et al, 2006: 71). Both sets of pedestals located outside Pottery Mound appear to be floating on the surface (i.e. unattached to a wall or other structure) (Lehner et al, 2006: 71). Similar pedestals have been excavated in Area AA and MSE in Heit el-Ghurob (Lehner et al, 2006: 71). Their structure indicates they were used for storage (Lehner et al, 2006: 71).

²⁰ I chose, first, to explore and articulate the context in which the sealings, the main data of my thesis, were excavated and second, to describe the objects. Details of the sealings, including their shape, object impressions, seal impressions, markings, materials and any other relevant information, excavated in House Unit 1 will be discussed in Chapter 3, section 3.1.

²¹ The western extent of the southern wall has not been excavated yet (Lehner, Kamel and Tavares 2006: 69).

Pottery Mound itself is comprised of several sloping deposits of sandy mudbrick collapse (from House Unit 1), broken ceramics, animal bones, sealings (see Chapter 3: section 3.1) and other debris (e.g. flint knives, beads, oval ceramic objects, whetstones, fragments of diorite hammers, a bone tool and a conical limestone object) (Lehner et al, 2006: 69, 71-73; Nolan 2010: 19). Beer jars and other forms of handmade, crude red-ware jars excavated in Pottery Mound suggest a 4th Dynasty date (Lehner et al, 2006: 71). The fauna remains consist mainly of cattle, sheep, pig and fish bones; however, two leopard teeth were also excavated (Lehner et al, 2006: 71). The cattle bones belonged to both calves and bulls, the sheep bones belonged to young sheep and the pig bones belonged to mature pigs (Lehner et al, 2006: 71-72). Cattle bones were excavated in far greater numbers than other animals' bones: one cattle bone excavated for every 0.2 sheep bone excavated) (Lehner et al, 2006: 71-72). Cattle bones were also excavated in far greater numbers in Pottery Mound than other sites in the HeG: one cattle bone per three sheep bones (Lehner et al, 2006: 72). The large number of cattle bones indicates elite people were active in the Pottery Mound area and used Pottery Mound as their dump (Lehner and Hawass 2017: 383). It also supports Nolan's (2010) conclusion that high-ranking scribes worked in this area.

A large deposit, rich in sealings (Chapter 3: section 3.1), sealing-related objects, pottery, animal bones and other debris (27,156), was excavated near the surface (phase VI) and was interpreted as the main dumping event at Pottery Mound (Kawae 2009: 90). It lay over a deposit containing sandy mudbrick collapse from House Unit 1 (27,157). The relationship between these deposits indicates the main event that created Pottery Mound occurred after House Unit 1 began to be demolished²² (Kawae 2009: 90). A 3rd deposit

²² The sheer volume of mudbrick tumble excavated in deposit 27,157 indicates House Unit 1 was likely demolished on purpose rather than allowed to naturally decay and collapse (Kawae 2009: 91).

containing sealings (Chapter 3: section 3.1), animal bones, lithic fragments, and charcoal (27,158) was excavated beneath deposit 27,157, suggesting small-scale dumping events occurred prior to House Unit 1's destruction (Kawae 2009: 91). The stratigraphy of Pottery Mound and House Unit 1 together indicates Pottery Mound functioned as a dump for House Unit 1 while the house was occupied and during its abandonment (Kawae 2009).

Pottery Mound was deposited in several phases, each of which included different features (i.e. depositional units) and artifacts (Nolan 2010: 302). The artifacts can be used to suggest when Pottery Mound, and perhaps each phase, was deposited. Seal impressions with Khafre's and Menkaure's Horus names were excavated in phases III-VI (Nolan 2010: 305, table 3.4). This indicates the originating seals were made and used during these kings' reigns in the mid 4th Dynasty, which further suggests Pottery Mound was deposited during the same period (Chapter 1). A preliminary report on the ceramics excavated in Pottery Mound also supports a 4th Dynasty date (Nolan 2010).

Layer III may be assigned to Khafre's reign because no sealings with Menkaure's Horus name were excavated in it. Layers IV-VI may be assigned to Menkaure's reign because they yielded sealings with Menkaure's Horus name. The difficulty remains in making sense of the sealings bearing Khafre's Horus name excavated in these latter phases because their originating seals should not have been used in the new king's (i.e. Menkaure's) reign (Chapter 1). There are two possible explanations for these sealings. First, the sealings were left over from an earlier period: they were impressed during Khafre's reign (in phase III or earlier), kept in place on their containers, and then broken and discarded during Menkaure's reign. Evidence supporting this idea is lacking: no evidence of long-term storage has been published. Second, the different phases of Pottery Mound represent dumping events

that occurred during a transitional period between Khafre's and Menkaure's reigns: layer III was deposited at the end of Khafre's reign and layers IV-V were deposited at the beginning of Menkaure's reign. The officials responsible for the sealings excavated in Pottery Mound may not have all received their new seals and so continued to use seals from Khafre's reign in order to continue their official work. It is impossible to know when, specifically, the sealings were dumped, but Pottery Mound was likely deposited during the transition from Khafre's to Menkaure's reign.

2.10 Standing Wall Island

Standing Wall Island (hereafter SWI) lies south of Heit el-Ghurob and is separated from HeG by a lagoon (Lagoon 1) (see map 2.14). SWI consists of two enclosures and a large enclosure wall made from fieldstone (Redding 2011: 2). Both enclosures yielded ephemeral structures on their interior; however, nothing else has been excavated in them yet and their functions remain mysteries (Redding 2011: 2). The large enclosure wall runs south of these enclosures for 35m (Redding 2011: 2). Then, it turns east for 31m and north for 25m until it disappears under the modern Abu el-Hol Soccer Field (Redding 2011: 2). The enclosure wall essentially creates a large rectangle with rounded corners (see map 2.14). Redding (2011: 2), AERA's resident faunal remains specialist, speculates it was a pen for cattle, sheep/goats and pigs because of the rounded corners: animal pens typically have rounded corners so that the animals do not get stuck in a corner and animal pens depicted in Egyptian art often have rounded corners. A corridor has also been excavated in the eastern portion of the pen, and it has been interpreted as a chute for driving animals into the pen (Redding 2011: 4). The location of SWI south of the town is also telling: the noise and smells of an animal pen would

be carried away from HeG by winds on the Giza plateau arriving from the northwest (Redding 2011: 5).

2.11 Gebel el-Quibli

Gebel el-Quibli is a mound of debris located 200m west of Heit el-Ghurob (see map 2.2). Kromer dug this site for four seasons from 1971-1975 and published his findings in *Siedlungsfunde aus dem frühen Alten Reich in Giseh: Österreichische Ausgrabungen, 1971-1975* (1978). He (1978) excavated a variety of object types and interpreted the site as a dump for a “royal-rest-house” in use from the 1st-4th Dynasties until Khafre’s reign. Kromer (1978) based his interpretation of the material on the great quantity of varied material culture his team excavated and on the discovery of seal impressions bearing Khufu’s and Khafre’s Horus names (Chapter 3: section 3.3).

Recent excavation by the AERA team has yielded both old and new material culture. Of particular note are the fragments of striated flooring, mudbricks and doorjambs, some of which were plastered in red, white, black and blue with evidence of dados or painted bands at their bases (Witsell 2018: 5). They and their decoration indicate some of the material dumped at this site originated from a building of some importance and long-lasting use (Witsell 2018: 5-6). Other finds include sealings, animal bones, beads, tools, pottery, metal fragments, alabaster vessels, decorative inlay, carnelian and a stone table and suggest a mixture of both non-elite and elite sources (Witsell 2018: 6). Where exactly this material originated and whether it came from one or more structures remains a mystery; however, AERA’s planned, future excavations will hopefully shed light on the primary contexts in which this rich array of material was used.

Conclusion

The archaeological evidence indicates Giza functioned as a royal mortuary site during the Old Kingdom. Funerary monuments for royals and elites dot the landscape and attest to the very real importance of this site in ancient Egyptian political-religious mythology.

However, Giza was not only for the dead. This funerary landscape included settlements where pyramid builders and specialist craftsmen lived and worked and where government officials, responsible for the management of pyramid construction, conducted business. It also included the homes and workspaces of the people who supported those who labored on the pyramids (e.g. cooks, bakers, brewers, messengers) and all of their families. Men and women worked together on professional and community tasks, and children (buried in the worker's cemetery, section 2.6) likely played in the streets. Giza was not a silent testament to the memory of powerful kings; rather, it was a bustling community that worked and lived in the shadows of the pyramids.

This socio-professional community operated via an extensive and complex administration. This administration made it possible to build the pyramids because it connected and organized each person in a network of labor. The sealing administration was a key part of the overall administration, and the bones of its network (i.e. sealings) will be explored in the following chapter.

Chapter 3: Sealing Data from Giza

In this chapter, I describe the various sealing corpora excavated at Giza, how they have been studied and interpreted, and what conclusions about them have been drawn. I first explore the material excavated at Pottery Mound and House Unit 1 (3.1) as well as the rest of Heit el-Ghurob (3.2), and then I examine the sealings and sealing-related objects excavated in Gebel Quibli (3.3), Khentkawes Town (3.4), Silo Building Complex (3.5) and Menkaure Valley Temple (3.6).

3.1 Pottery Mound and House Unit 1

A significant number (1,199)²³ of sealings and sealing-related objects were excavated in Pottery Mound. These include 1,036 impressed sealings, 92 incised sealings and 66 sealing-related objects (Nolan 2010: 127)²⁴. John Nolan, AERA epigraphic expert, studied, interpreted and published a database²⁵ of these sealings for his PhD dissertation (2010). My work makes use of his dataset and study because they provide a foundation for my communities of practice analysis.

The majority of sealings (673) were excavated in phase VI-c, feature 21,557 (Nolan 2010: 305, 307). Feature 21,557 is located within deposit 21,156 (Chapter 2: section 2.9.11) and is considered part of the same large dumping event (phase VI) that created most of Pottery Mound (Kawae 2009: 90-91). Feature 21,557 contained well preserved, fragile

²³ The sealings and sealing-related objects excavated at Pottery Mound constitute the largest corpus of sealings from the Old Kingdom (Nolan 2010: 20).

²⁴ Roughly 2,540 sealings and sealing-related objects were excavated in Pottery Mound; however, only 1,199 have been fully analyzed and published (Lehner et al, 2006: 72; Nolan 2010: 127).

²⁵ <http://oi-archive.uchicago.edu/research/is/scholars/nolan/>

animal bones in addition to sealings (Redding 2007a: 385; Nolan 2010: 309). The bones' fragile but well-preserved nature suggests Pottery Mound was the bones' first and last resting place: the delicate bones would not be so well preserved if they had been moved several times around the site prior to dumping²⁶ or come from a far-away place. This faunal evidence indicates the animal bones and other artifacts excavated in feature 21,557 were dumped from a nearby location, suggesting the sealings were made and used close to Pottery Mound (Redding 2007a: 385; Nolan 2010: 309). It is possible the scribes in House Unit 1 threw their discarded sealings directly outside and into Pottery Mound on a regular basis; however, it is equally possible the scribes used their sealings, gathered them when they were ready to abandon House Unit 1 and then dumped them in one event (i.e. phase VI). According to the original excavators, the archaeological evidence (Chapter 2: section 2.9.11) suggests phase VI was deposited in one event rather than over time (Kawae 2009: 90-91).

A similar conclusion about the sealings' origins was drawn from the animal bones excavated in phase III, deposit 24,462. This is the earliest phase and feature in which sealings were excavated, and it yielded 16 sealings (Redding 2007b: 395; Nolan 2010: 309). These findings, in addition to the archaeology of Pottery Mound (Chapter 2: section 2.9.11), support an interpretation of the sealings as being produced and used within the vicinity of where they were dumped.

²⁶ Sealings, bones and other objects may be discarded and then moved around the site as trash until they are discarded for the last time (Nolan 2010: 45). This process would suggest an intentional gathering of debris from across the site, which does not appear to be the case at Pottery Mound due to the preserved nature of the fragile bones. Rather, it supports the excavators' interpretation of Pottery Mound's debris as having been gathered from nearby (e.g. in House Unit 1), and not from across the whole site of Giza (or even across the Heit el-Ghurob), and thrown directly into the Pottery Mound site in one event.

In addition, a further 139 sealings were excavated in phase VI-c, 62 sealings in phase VI-b, 196 sealings in phase VI-a, 13 sealings in phase V, 16 sealings in phase IV and 2 sealings in phase III. Two sealings were also excavated on the surface in phase VII (Nolan 2010: 304, table 3.3). The stratigraphy of the sealings can be seen in table 3.1.

3.1.1 Seal Impressions

The impressed sealings' glyptic can be categorized into two main types²⁷ of sealings: Formal (981) and Informal (49) (Nolan 2010: 73-76). This categorization is based on the type and arrangement of symbols. Formal sealings (see fig. 3.1) consist of various combinations of *serekhs*, *cartouches*, administrative titles, royal epithets, epithets common among administrators of the central administration (e.g. *hnty* meaning foremost, *mry* meaning beloved) and standard, grammatical layouts (Nolan 2010: 73-74). Nolan (2010: 75) suggests sealings of this type were likely impressed by Official Seals, Officials' Seals and Administrative Seals²⁸. Official Seals bear the reigning king's Horus name (i.e. *serekh*), common epithets and sometimes other names²⁹, as well as the seal owner's administrative titles (Nolan 2010: 61-62; Kaplony 1978: 48). They were used within the central administration by administrators of elite status as indicated by the inclusion of the king's name and seal owners' titles and epithets (Kaplony 1978: 48). *Serekhs* on Official Seals are important because they designate the king's reign during which the seals were made and used (Chapter 1: section 1.2). The conglomeration of titles is equally significant because it

²⁷ He (2010: 73) also notes six sealings he could not identify as either Formal or Informal because the impressions are not well enough preserved, and he labels them as "Undetermined."

²⁸ Nolan developed this terminology based on Kaplony's (1977) original work: Official Seals correspond to Amtssiegels, Officials' Seals correspond to Beamtensiegels, and Administrative Seals correspond to Verwaltungssiegels.

²⁹ The pharaoh had five names: his Horus name, Golden name, Two Ladies name, nomen and prenomen (Kaplony 1977). The Horus name always appears on Official Seals; however, one or another of his other names occasionally appear as well.

identifies the seal owner without naming the individual: only one administrator could have held the particular group of titles on his Official Seal at one time (Nolan 2010: 65).

Officials' Seals contain the owner's titles and sometimes personal names arranged in a structured format (Nolan 2010: 65). They notably do not contain the king's name and are often more crudely inscribed than Official Seals (Nolan 2018: 274). Officials' Seals are relatively rare in the archaeological record of the Old Kingdom (Nolan 2018: 274). The disappearance of this type (Nolan 2010: 65) may be explained by the expansion of royal power during this period (Kaplony 1978: 48-49) or by the lack of excavated sites in the provinces (Nolan 2010: 64). Both explanations are reasonable and are not contradictory, and they likely explain the disappearance of the Official Seal during the Old Kingdom.

Administrative Seals consist of institutional labels including offices, institutions and locales, as well as royal names in either *serekhs* or cartouches (Nolan 2010: 68). The excavation of sealings bearing impressions made by all three types of seal is important because it indicates the sealing activity at Pottery Mound occurred within the context of the central administration.

Informal sealings (see fig. 3.2) contain hieroglyphs, graphic elements and free-flowing composition (Nolan 2010: 73). Graphic elements common among the Pottery Mound corpus include decorative hieroglyphs, geometric shapes and patterns, animal rows, and cross-hatching (Nolan 2010: 230). Sealings with both hieroglyphs and graphic elements could have been made by Administrative Seals (Nolan 2010: 75). Administrative Seals frequently include cartouches with the pharaohs' names in them, either alone or as part of the name of a pyramid or domain, as well as administrative titles related to the central

administration (Nolan 2010: 73-74; Kaplony 1977: 19-21). The excavation of Informal sealings likely impressed by Administrative Seals indicates the sealing activity that produced these sealings occurred within the context of the central administration.

Sealings that contain only graphic elements were probably made by Figure Seals³⁰ (Nolan 2010: 75). Figure Seals often consist of various graphic elements arranged in unpredictable patterns, and neither the patterns nor the quality of carvings is consistent among the many Figure Seals (Nolan 2010: 71-72; Nolan 2018: 274). Kaplony (1983: 295) suggests this type of seal was used in either a household or personal context due to its informal and individual appearance. Nolan (2018: 274) also suggests Figure Seals were produced and made for personal use and highlights a scene in the Tomb of Niankhkhnum and Khnumhotep at Saqqara (Moussa and Altenmüller 1977: 83, scene 11.3.4, abb. 10) in which a fishmonger trades his goods for a seal with Informal glyptic at a market as evidence. The variety in symbols and composition among Figure Seals of the Old Kingdom contrasts with the uniformity of Official Seals and suggests the production of Figure Seals was decentralized and likely for personal use. The excavation of sealings with impressions likely made by Figure Seals indicates some sealing activity at Pottery Mound occurred within the context of personal administration.

The categorization of the Pottery Mound sealings into Formal and Informal is important for two reasons. First, it emphasizes the degree of formality in the seal impressions and the seals used to make them: the ratio of Formal to Informal sealings is roughly 7:1. This suggests formal glyptic was used quite a bit more frequently than informal glyptic. The high degree of Formal sealings also suggests the sealing activity that produced the Pottery Mound

³⁰ Nolan's Figure Seal corresponds to Kaplony's (1977) Figurensiegel.

sealings related to the central administration. The Official Seals and Officials' Seals, in particular, emphasize the connection between Pottery Mound and the ancient Egyptian government.

Second, the categorization highlights the two different forms of communication employed at Pottery Mound. The use of Formal and Informal glyptic requires different abilities: those using Formal glyptic needed to be able to read hieroglyphs and interpret the grammatical structure of the seal's composition, and those using Informal glyptic needed to be able to interpret the graphic elements and seal's unique composition. Whether both the Formal and Informal glyptic were used in the central administration remains a question.

3.1.2 Incised Sealings

Sealings with incised marks (see fig. 3.3) were also excavated in Pottery Mound. Nolan (2010: 127) suggests the incised marks are hieratic. The use of hieratic (e.g. 2671, 2955) seems very likely because it is known from other sites (e.g. Abusir), though other sealings (e.g. 3067, 3069) appear to bear geometric graphic symbols. Those hieratic marks still prove impossible to decipher because their markings are only partially preserved.

Incised sealings are not common among other sealing corpora excavated in Egypt and dated to the Old Kingdom. Only eleven incised sealings were excavated at the Raneferef Pyramid Complex in Abusir (Jerábek 2018: 22). Ten sealings were incised with what appear to be Hieratic, and one sealing was incised with graphic symbols (Jerábek 2018: 22).

3.1.3 Object Impressions

Seven different types of sealing (see table 3.2) have been identified in the Pottery Mound corpus: bag sealings³¹ (14), a basket sealing³² (1), box sealings³³ (268), door sealings³⁴ (2), jar sealings³⁵ (33), papyrus sealings³⁶ (35) and peg-and-string sealings³⁷ (35)³⁸. The remaining 745 sealings bore object impressions of indeterminate type.

³¹ Sealings 2794, 2798, 2818, 2827, 2875, 2900, 3071, 3109, 3196, 3219, 3328, 3242, 3262 and 3542.

³² Sealing 3320.

³³ Sealings 2674, 2675, 2677, 2686, 2696, 2700, 2724, 2725, 2744, 2753, 2762, 2765, 2767, 2770, 2776, 2777, 2781, 2787, 2793, 2795, 2796, 2808, 2812, 2821, 2846, 2852, 2854, 2861, 2866, 2873, 2876, 2877, 2880, 2883, 2884, 2885, 2886, 2895, 2897, 2898, 2901, 2902, 2903, 2904, 2907, 2913, 2918, 2919, 2921, 2925, 2934, 2935, 2936, 2938, 2944, 2947, 2948, 2949, 2950, 2951, 2952, 2953, 3041, 3042, 3043, 3047, 3056, 3059, 3060, 3086, 3088, 3090, 3093, 3094, 3112, 3114, 3116, 3117, 3122, 3125, 3129, 3130, 3141, 3142, 3145, 3151, 3152, 3153, 3161, 3165, 3169, 3175, 3176, 3179, 3182, 3183, 3186, 3187, 3193, 3194, 3195, 3207, 3209, 3212, 3214, 3216, 3222, 3226, 3232, 3239, 3241, 3247, 3248, 3249, 3263, 3266, 3267, 3268, 3280, 3282, 3285, 3286, 3294, 3299, 3301, 3306, 3310, 3312, 3330, 3333, 3334, 3337, 3338, 3361, 3368, 3372, 3373, 3391, 3392, 3396, 3404, 3406, 3407, 3412, 3413, 3414, 3417, 3418, 3421, 3432, 3448, 3456, 3457, 3458, 3468, 3473, 3474, 3478, 3483, 3484, 3485, 3486, 3488, 3491, 3492, 3494, 3495, 3501, 3507, 3510, 3513, 3520, 3524, 3527, 3534, 3537, 3543, 3562, 3571, 3574, 3575, 3576, 3585, 3586, 3591, 3592, 3593, 3594, 3595, 3600, 3601, 3602, 3604, 3606, 3607, 3609, 3612, 3614, 3618, 3621, 3623, 3624, 3626, 3628, 3634, 3635, 3636, 3640, 3652, 3668, 3669, 3670, 3671, 3679, 3689, 3690, 3697, 3700, 3701, 3707, 3708, 3709, 3713, 3718, 3719, 3723, 3725, 3728, 3734, 3738, 3739, 3747, 3761, 3762, 3766, 3768, 3780, 3783, 3784, 3786, 3787, 3790, 3792, 3793, 3796, 3800, 3811, 3813, 3818, 3830, 3836, 4423, 4431, 4432, 4444, 4457, 4465, 4466, 4479, 4487, 4500, 4501, 4510, 4512, 4524, 4528, 4529 and 4696.

³⁴ Sealings 2834 and 3022.

³⁵ Sealings 2664, 2666, 2683, 2868, 2931, 2933, 2941, 3068, 3069, 3075, 3099, 3150, 3168, 3215, 3224, 3256, 3257, 3259, 3265, 3383, 3441, 3481, 3518, 3557, 3819, 3837, 4463, 4523, 4546, 4558, 4567 and 4689.

³⁶ Sealings 2701, 2726, 2743, 2746, 2775, 2784, 2791, 2829, 2838, 2857, 2859, 2878, 2896, 2920, 2937, 2942, 2954, 2697, 3105, 3254, 3273, 3381, 3411, 3415, 3437, 3454, 3466, 3539, 3561, 3656, 3657, 3681, 3715, 3791 and 3799.

³⁷ Sealings 2676, 2718, 2721, 2774, 2842, 2853, 2889, 2892, 2939, 3074, 3089, 3124, 3197, 3283, 3309, 3350, 3355, 3378, 3399, 3460, 3516, 3523, 3573, 3583, 3645, 3673, 3721, 3743, 3821, 4410, 4451, 4475, 4502, 4511, 4519 and 3821.

³⁸ My categorization differs slightly from Nolan's (2010: 86, table 1.1) original classifications. He (2010: 89-90) included a category labeled "possible container," which are sealings shaped similarly to bag or jar sealings but with "ambiguous traces of leather, textile or string" on their backs. I found this category to be unhelpful for my analysis because it was too ambiguous and decided to classify those sealings as indeterminate. I also included stoppers and toppers in the category jar sealings because they close and secure jars.

Bag sealings³⁹ exist in a variety of shapes and sizes, and they contain impressions of bunched textiles and often strings (see fig. 3.4). A bag sealing can sit either in the mouth of the bag or on the outside of the bag near the neck (Ferioli and Fiandra 2007: 72-77; Blöbaum 2021). The bag sealings excavated at Pottery Mound are incomplete and preserve only partial impressions and shapes but appear to be of the former type.

The lone basket sealing⁴⁰ is small, angular and incomplete, and it bears the impression of a regular weave of basket fibers and some strings (see fig. 3.5). A basket sealing can sit either on the top and side of the basket or on the top of the basket on string that secures the basket lid to the body (Ferioli and Fiandra 2007: 87-90; Blöbaum forthcoming).

Box sealings⁴¹ are relatively flat and contain impressions of wood grain and sometimes strings (see fig. 3.6). A box sealing usually sits on the top or sides of the box on a string that secures the box, but it can also sit on the box's lock if one exists (Engel and Müller 2000: 39-41). In the latter case, impressions of the lock will also be visible⁴². Most box sealings excavated at Pottery Mound are incomplete and only preserve partial impressions and shapes, and there are no examples of locks.

³⁹ For additional description and discussion of bag sealings excavated in Egypt and the Near East, see Engel and Müller 2000: 38-40; Pätznick 2005: 54; Ferioli and Fiandra 2007: 72-77; Nolan 2010: 88-92; Jerábek 2018: 26.

⁴⁰ For further description and discussion of basket sealings excavated in Egypt and the Near East, see Pätznick 2005: 53; Ferioli and Fiandra 2007: 85-91; Nolan 2010: 92-94; Blöbaum forthcoming.

⁴¹ For additional description and discussion of box sealings excavated in Egypt, see Engel and Müller 2000: 39-41; Pätznick 2005: 42-47; Nolan 2010: 94-98; Jerábek 2018: 28.

⁴² This appears to be the case with the box sealings excavated with a wooden chest in the Old Kingdom tomb G5370 (Junker 1944: Taf. XVIII, XIX).

The two door sealings⁴³ are angular and bear impressions of wood grain (see fig. 3.7). One appears to also contain two impressions of string. A door sealing of this type would likely have sat on a peg and over string wound around the peg and attached to the back side of a door (Ferioli and Fiandra 2007: 90-97). The peg would have been set into the wall near the door and served as an indirect locking mechanism. The other door sealing appears to bear impressions of plaster alongside wood grain. A door sealing of this type would likely have sat partly on a wooden door bolt and partly on a plastered door (Engel and Müller 2000: 41-43; Nolan 2010: 99-100).

Jar sealings⁴⁴ exist in a variety of sizes and shapes. Those excavated at Pottery Mound are classified as small jar sealings, and they bear the shape of the jars to which they were affixed. Small jar sealings can contain several different types of impressions that depend on where they are placed on the jar (see fig. 3.8). A direct jar sealing sits directly on a jar's shoulder, rim and mouth (Engel and Müller 2000: 35-38; Ferioli and Fiandra 2007: 83). An indirect jar sealing sits either partially or fully on material (e.g. textile, leather, organic materials) that covers a jar across its mouth and over its rim and shoulders (Engel and Müller 2000: 37-39; Ferioli and Fiandra 2007: 83-84). A stopper sits deep within a jar's neck, and a topper sits high within a jar's neck (Engel and Müller 2000: 37-38; Ferioli and Fiandra 2007: 79-83). All four types of jar sealing were identified in the Pottery Mound corpus.

⁴³ For further description and discussion of door sealings excavated in Egypt and the Near East, see Engel and Müller 2000: 41-43; Pätznick 2005: 57-60; Ferioli and Fiandra 2007: 90-97; Nolan 2010: 98-101.

⁴⁴ For additional description and discussion of jar sealings excavated in Egypt and the Near East, see Engel and Müller 2000: 34-38; Pätznick 2005: 13-38; Ferioli and Fiandra 2007: 79-87; Nolan 2010: 101-109, 113-116; Jerábek 2018: 26-27.

Small jar sealings stand in contrast to large jar sealings. Large jar sealings are big lumps of clay shaped like cones, hemispheres or bottle-caps (Engel and Müller 2000: 35-36). Visual representations of large jar sealings can be found in Old Kingdom tomb reliefs from G4561 at Giza (Junker 1940: Taf. VI, VIII; Porter and Moss 1974: 132), LG53 at Giza (Junker 1953: Abb. 64; Porter and Moss 1974: 224) and LG86 at Giza (Porter and Moss 1974: 231). These depictions indicate jars were frequently secured with large sealings in order to preserve beer, wine and other foodstuffs.

Papyrus sealings⁴⁵ are typically flat and bear impressions of papyrus ridges, strings and sometimes document folds (see fig. 3.9). A papyrus sealing can sit either flat against the papyrus document and string used to secure it, or over the folded section of the document (Engel and Müller 2000: 42-44; Pätznick 2005: 61-62; Blöbaum forthcoming). Both types of papyrus sealing were excavated at Pottery Mound.

Peg-and-string sealings⁴⁶ are usually rounded and contain impressions of wood grain and string (see fig. 3.7, 3.10). A peg-and-string sealing usually sits on the top or side of a peg that has been wrapped with a string (Pätznick 2005: 57-59; Ferioli and Fiandra 2007: 90-97). Peg-and-string devices were often used to secure doors and boxes and sometimes bags (Nolan 2010: 110-112). The different types of peg-and-string sealings can sometimes be identified by their impressions. Those with impressions of strings with diameters larger than 3cm or that contain impressions of door plaster are door peg-and-string sealings (Nolan 2010: 99). Those with impressions of textiles, wood grain and strings are bag peg-and-string

⁴⁵ For further description and discussion of papyrus sealings excavated in Egypt, see Engel and Müller 2000: 42-44; Pätznick 2005: 61-62; Nolan 2010: 109-110; Jerábek 2018: 28.

⁴⁶ For additional description and discussion of peg-and-string sealings excavated in Egypt and the Near East, see Pätznick 2005: 57-59; Ferioli and Fiandra 2007: 90-97; Nolan 2010: 110-112; Jerábek 2018: 27-28.

sealings. Box peg-and-string sealings are the most difficult to identify and often require nearly the full sealing to identify. Only one door peg-and-string sealing was identified in the Pottery Mound corpus (see above). The rest of the peg-and-string sealings remain unidentified and are simply labeled peg-and-string.

3.1.4 Sealing-Related Objects

In addition, 66 sealing-related objects were identified in the Pottery Mound corpus (Nolan 2010: 127). The majority of objects (60) were classified as blanks⁴⁷. These include scraps of unused sealing clay and cores of levigated sealing clay. Cores are defined as the main lumps of levigated clay from which the sealings were originally detached and made (Nolan 2010: 211). Evidence from the Near East (e.g. Arslantepe, Mari, Susa) suggests they were prepared well in advance of use for sealing production, but had to be properly moistened (and perhaps continually re-moistened) in order to remain flexible enough to be attached to an object and impressed with a seal or incised with a stylus (Ferioli and Fiandra 2007: 72). The cores from Arslantepe (in eastern Turkey) were excavated in the upper layers of the dump, suggesting they were only discarded in the final stage of administrative activity on site (Ferioli and Fiandra 2007: 72). A similar situation prevails at Pottery Mound, although a few cores were excavated in the site's lower phases (III-V).

Three objects were classified as discarded sealings⁴⁸. Discarded sealings are sealings that were applied when wet and removed while still wet, and then crumpled and dumped

⁴⁷ Sealings 2678, 2813, 2862, 3065, 3066, 3073, 3077, 3078, 4537, 4538, 4539, 4545, 4547, 4548, 4549, 4551, 4552, 4554, 4555, 4556, 4557, 4559, 4560, 4561, 4562, 4563, 4564, 4565, 4566, 4568, 4569, 4570, 4571, 4572, 4573, 4574, 4653, 4654, 4655, 4656, 4657, 4659, 4660, 4670, 4671, 4672, 4673, 4674, 4675, 4676, 4677, 4678, 4680, 4681, 4682, 4683, 4684, 4685, 4686 and 4687.

⁴⁸ Sealing 4553, 4658 and 4688.

(Nolan 2010: 311). One of these sealings broke open and revealed impressions from Seal 8, and this same sealing bore vague impressions of wood grain and string (Nolan 2010: 311). Nolan (2010: 311-312) suggests it originally secured a box before it was deemed unsuitable and discarded.

Two sealing-related objects were identified as tokens⁴⁹. The tokens are small and roughly round pieces of clay that have been intentionally and precisely worked on all their surfaces. Tokens are very well known from ancient Near Eastern sites (e.g. Abu Salabikh, Nuzi, Tell Brak, Ziyaret Tepe), and it has been well established⁵⁰ they were used in ancient administrations both prior to and alongside writing (MacGinnis et al, 2014: 289-290). Their exact purpose is not always known; however, evidence from Nuzi suggests they were sometimes used to administer and record the transference of livestock (MacGinnis et al, 2014: 291).

Tokens were likely used as administrative tools during the Old Kingdom; however, very few are recorded in the published administrative assemblages of ancient Egyptian sites. Clay objects classified as tokens were excavated at Balat (in the western desert). Pantalacci (2013: 204) notes tokens were excavated together with Informal Seals, and both types of administrative tools appear more frequently than Formal Seals. A comparison of objects in the Pottery Mound corpus indicates more Formal Seals than Informal Seals and tokens were used at this site. This suggests tokens were used more frequently in less non-royal settings (e.g. provincial towns) than in royal settings (e.g. centralized towns).

⁴⁹ Sealing 4669 and 4679.

⁵⁰ For further description and discussion of administrative tokens in the ancient Near East, see Oppenheim 1959; Amiet 1966; Lambert 1966; Jasim and Oates 1986; Schmandt-Besserat 1992; 1996; Powell 1992; Michalowsky 1993; Zimansky 1993; Friberg 1994.

One object was identified as part of a cylinder seal⁵¹. It is small and curved, and most of its glyptic is too worn to read or interpret. Cylinder seals originated in the Near East⁵² and became popular in Egypt⁵³ in the late 4th millennium bce (Wegner 2018: 233). They continued in use throughout the Old Kingdom until they were more-or-less replaced by stamp seals as the dominant form of seal in the late Old Kingdom and First Intermediate Period (Wegner 2018: 235-236). The reason for their decline may relate to the decentralization of government in Egypt at the end of the 6th Dynasty and beginning of the First Intermediate Period (Wenger 2018: 236). There would have been less of a need for cylinder seals to be produced because the administrative activities of the central government would have decreased significantly.

3.1.5 Local Sealing Activity

In addition to the stratigraphy and architecture discussed in Chapter 2 (sections 2.9.10 and 2.9.11), seal impressions, sealings and sealing-related objects shed light on whether the administration was local to Pottery Mound. This is important to try to uncover because it demonstrates where the sealers' lived experience (Chapter 4) might have occurred. Sealing includes the following activities: mixing the clay, making the sealing, securing it to the object, impressing it with a seal, reading the seal impression, breaking the sealing and discarding the sealing. Sealing administration may be considered local if all of these activities occurred at or near Pottery Mound. It may be considered partially local if only the first or second half of the process occurred at or near Pottery Mound.

⁵¹ Sealing 3037. It was likely classified as a "sealing" in order for the labelling system to remain consistent.

⁵² For discussion of the origins of cylinder seals in the ancient Near East, see Gorelick and Gwinnett 1981; Porada 1993; Collon 2006.

⁵³ For discussion of the transference of sealing technology from the ancient Near East to Egypt in the 4th millennium bce, see Frankfort 1939; Teissier 1987; Hill 2004; Honoré 2007; Wengrow 2008.

Some sealings indicate local administration, either at or near Pottery Mound. The door sealings are good examples, even though only two were identified, because the doors to which they were attached would not have moved. In addition, these door sealings were impressed with Seal 3; therefore, it can be assumed other sealings impressed with Seal 3 were employed in a local administration. Seal 3 impressed 56 sealings overall, 53 in Layer VI, and the following categories: box sealing, jar sealing, papyrus sealing and peg-and-string sealing. This indicates several different activities were part of the resident administration.

A complete, discarded bag sealing is another good example. It was likely applied to a bag, impressed, deemed unworthy (for unknown reasons) and discarded before it could be completely employed. Sealings excavated in dumps like Pottery Mound would usually be broken, but this sealing was whole, which suggests it was taken off the bag prior to use. This sealing also bore muddled impressions of Seal 8 (perhaps the illegibility caused it to be taken off the bag originally), which suggests other sealings impressed by Seal 8 were made and used locally. Seal 8 impressed 22 sealings overall, 21 in Layer VI, and in the following categories: bag sealing, box sealing, papyrus sealing and peg-and-string sealing. Like with Seal 3, this indicates several different activities occurred in residence.

The box sealings may also be examples. They are flat and bear impressions of wood grain. A flat, wooden box fits the description of the scribal box excavated at Gebelein (Posener-Krieger 1975: 211-212), and scribal boxes were known to be sealed (Nolan 2010: 287). In addition, all but two box sealings' seal impressions contain scribal titles, which further suggests the sealings secured scribal boxes. The high number of box sealings excavated in Pottery Mound might have been caused by repetitive activity, like opening and closing the boxes every day. These boxes were plausibly used regularly as part of scribal

activity at or near Pottery Mound. Additional seal impressions excavated in House Unit 1, as well as the stratigraphic relationship between House Unit 1 and Pottery Mound (Chapter 2: sections 2.9.10 and 2.9.11), suggest this building as the likely locale.

However, the box sealings are not conclusive. Flat, wooden boxes (although not scribal kits) are depicted being moved in some tomb reliefs (e.g. Mastaba of Mereruka (Duell 1938: pl. 99)). This means the sealing activity occurred in different locations: the boxes were closed and sealed in one area, and the sealings were then read, broken and discarded in a different area. This scenario would have occurred if the boxes were used to transport goods between two locales. Although the full administrative process of sealing boxes may not have occurred at or near Pottery Mound, a part of it did, which suggests local activity.

The sealing-related objects indicate sealing activity occurred in residence. Balls of prepared sealing clay and clay cores were used to make sealings and indicate some sealings were produced locally. Complete, discarded sealings are the result of errors in either applying the sealing to an object or impressing it with a seal. They represent the first half of the sealing process and indicate it took place locally.

The remaining sealings and sealing-related objects are ambiguous and could indicate the full process or only the second half of it occurred at or near Pottery Mound. Bags, baskets, jars and peg-and-string devices could have functioned as either stationary storage containers or mobile transports; thus, whether their sealings belonged to local administration cannot be known. Papyri might have been sealed and sent to be opened at or near Pottery Mound (e.g. in House Unit 1), or they might have been sealed and archived (e.g. in House

Unit 1) and opened at a later date; thus, whether they were sealed locally also cannot be known.

The archaeology (stratigraphy, architecture, seal impressions, sealings, sealing-related objects) strongly suggests the sealing activity occurred locally, in House Unit 1, near Pottery Mound.

3.2 Heit el-Ghurob

Sealings and sealing-related objects were excavated at multiple sites in addition to Pottery Mound in Heit el-Ghurob. These sites include Area AA (3.2.1), Royal Administrative Building (3.2.2), Gallery Complex (3.2.3), East of Galleries (3.2.4), Eastern Compound (3.2.5) and Eastern Town (3.2.6).

3.2.1 Area AA

Approximately 989 sealings were excavated in Area AA (Lehner 2008: 2). This is the 2nd largest corpus (after Pottery Mound) excavated in Heit el-Ghurob (Murray 2011: 154). Both Formal and Informal Sealings were identified in the corpus. Many Formal sealings contain Khafre's and Menkaure's Horus names and indicate Area AA functioned during these pharaohs' reigns in the mid 4th Dynasty (Nolan 2014: 31). Twelve individual seals were recognized among the Formal Sealings (Nolan 2014: 29). Seven bore the title Assistant Royal Purification Priest, two bore the title Assistant Sub-Director of the Royal Funerary Workshop and two bore the title Inspector of the Assistants of the Royal Funerary Workshop (Nolan 2014: 29-30). One seal bore titles related to both occupations: Assistant Royal Purification

Priest of the Great House⁵⁴ and Sub-Director of the Royal Funerary Workshop (Nolan 2014: 29). Nolan (2014: 29) notes the latter seal suggests a close association between these two industries. The shared context in which these objects were excavated and the common root *wꜥb* supports this conclusion.

Several Formal sealings also contain impressions with “Temple of Khnum at Elephantine” as part of religious titles (Nolan 1998: 5). These titles indicate a clear connection between Giza and Elephantine during the mid 4th Dynasty. This connection is interesting because a) Elephantine is located in southern Egypt, and far from Giza, and b) it demonstrates the existence of an extended transportation network.

In addition, 239 Informal sealings were excavated in Area AA, and eight individual seals were identified within this corpus (Witsell 2014: 33-34). All bore the inscription “Seal of the Storehouse,” and various graphic elements, but none contained other administrative titles or personal names (Nolan 2014: 31). “Seal of the Storehouse” is a significant find because it suggests the seal belonged to and gained authority from the storehouse rather than the individual who owned it⁵⁵ (Nolan 2014: 31).

One Informal seal appears to have been of particular importance: Theoretical Seal B (Witsell 2014: 34). The sealings containing its impressions bear reverse impressions of peg-and-string devices, suggesting they were used to close storage bins atop the pedestals excavated in Area AA (Witsell 2014: 34). Witsell (2014: 34) suggests the sealers likely

⁵⁴ The “Great House” likely refers to the palace (Goelet 1982).

⁵⁵ Whether the seal’s authority arose from the position or the individual is a topic that remains to be discussed within the discipline but lies outside the purview of this dissertation. Kaplony (1981) published seals with “Seal of the Storehouse” inscriptions and would be a good starting point for this research.

worked in Area AA near where their sealings were deposited based on this discovery. This find provides rare insight into where the sealer who owned Theoretical Seal B worked because sealings can be excavated far from where they were originally used.

Finally, at least two different types of sealings were excavated in Area AA. These include jar sealings and peg-and-string sealings. Both types were likely used for storage as parts of the pedestal apparatuses in the Pedestal Building (Lehner et al, 2006: 72; AR 2010-2011b: 22). One sealing is rectangular and flat, and it bears only one cylinder seal impression (Nolan 1998: 5). Nolan (1988: 5) calls it a “reference impression” and suggests it was used to confirm the authority of the originating seal on various objects.

3.2.2 Royal Administrative Building

Upwards of 683 sealings or sealing-related objects have been excavated in the Royal Administrative Building: 390 sealings and 293 sealing-related objects (Murray 2011: 154). The 390 sealings can be further divided into sealings with cylinder seal impressions and sealings with incised markings: 285 bore impressions (in either Formal or Informal glyptic) and 105 bore incisions (AR 2010: 16; Murray 2011: 154).

Sealings were excavated in phases 3-9 of the RAB. Sixteen sealings and sealing-related objects were excavated in phase 3 (Murray 2011: 158). Scientific analysis suggests most (14/16) were made with the same clay used to make the RAB’s floor (as opposed to debris from activity in the RAB) (Murray 2011: 158). Three sealings also bore Khafre’s Horus name and indicate this phase was deposited during this king’s reign (Murray 2011: 158).

One hundred and eight sealings or sealing-related objects were excavated in phase 4 (Murray 2011: 159). Fifty-two sealings bear impressions: 16 made by Formal Seals and 32 made by Informal Seals (Murray 2011: 159). Murray (2011: 159) notes the rarity of finding more sealings with Informal rather than Formal glyptic and suggests it indicates non-centralized sealing administration dominated in this phase. Those made by Formal Seals contain both Khafre's and Menkaure's Horus names and suggest this phase was deposited during the latter king's reign (Murray 2011: 159).

Phase 5 yielded 19 sealings or sealing-related objects (Murray 2011: 162). At least 12 sealings bear discernible impressions, two of which might have been made by Official Seals (Murray 2011: 162). Sealings with Informal glyptic again outnumber the sealings with Formal glyptic.

Thirty-four sealings or sealing-related objects were excavated in phase 6 (Murray 2011: 162). Three of the 17 impressed sealings were made by Formal Seals, and the remaining 14 sealings were impressed by Informal Seals (Murray 2011: 162). Murray (2011: 162) again notes the preponderance of Informal Seals and suggests non-state sealing activity occurred more frequently than state sealing activity in this phase of the RAB.

Phase 7 yielded 162 sealings or sealing-related objects: 69 impressed sealings, 33 incised sealings, and 50 sealing-related objects (Murray 2011: 165). Bag, jar, papyrus and door sealings have been identified among the sealings (Murray 2011: 165). The bag and jar sealings constitute the largest number of identifiable sealings (55), and they were more frequently impressed with Informal Seals (39 sealings) than Formal Seals (16 sealings) (Murray 2011: 165). The papyrus sealings (6) were less well attested, and the majority (5)

were impressed by Formal Seals rather than Informal Seals (Murray 2011: 162). A comparison of the numbers of type of sealing (i.e. Informal v Formal) suggests closing and securing bags and jars with sealings occurred within the context of non-centralized sealing administration, whereas closing papyrus documents occurred within centralized administration (Murray 2011: 165). One door sealing was also excavated in phase 7, and it bore impressions of Informal glyptic (Murray 2011: 165). Murray (2011: 165) notes the individual responsible for securing the door was likely not part of the central administration because he or she used an Informal Seal.

Several sealings excavated in phase 7 also bear Horus names: two with Khafre's name, six with Menkaure's name, and two with Userkaf's name (Murray 2011: 165). The discovery of Userkaf's name likely suggests this phase was deposited during his reign at the beginning of the 5th Dynasty (Murray 2011: 165-166).

Phase 8 yielded 181 sealings or sealing-related objects (Murray 2011: 166). Murray (2011: 166) notes sealings with Informal glyptic are "twice as common" as those with Formal glyptic. This continues the pattern observed in the other phases. Two sealings impressed with Formal glyptic also bear Userkaf's Horus name, suggesting this phase was deposited during his reign (Murray 2011: 166).

The majority of identifiable sealings are jar sealings; however, papyrus and door sealings were also excavated in RAB (Murray 2011: 166). Jar sealings typically bear impressions made by Informal seals, similar to the jar sealings excavated in phase 7 (Murray 2011: 166). The papyrus sealings also often bear impressions made by Formal Seals, and the lone door sealing was incised with hieratic marks (Murray 2011: 166).

Two interesting titles appear on those sealings with Formal glyptic. The first is “Porter at the Will of the King of Upper and Lower Egypt” (Murray 2011: 166). It was found on five sealings, and all appear to be impressed by the same seal (Murray 2011: 166). The second title is “Elder of the Estate” (Murray 2011: 166). It was found on three sealings excavated in phase 8 (and one sealing excavated in phase 9), but the sealings were apparently impressed by different seals (Murray 2011: 166). The duties of this office are not well documented for the Old Kingdom (Murray 2011: 166); however, an inscription from the First Intermediate Period indicates it related to the provisioning of grain in the provinces (Murray 2011: 166). This title suggests the RAB sent shipments of grain to rural outposts or possibly received grain shipments from these outposts (Murray 2011: 166). This idea is plausible because the silos and other archaeological evidence excavated in RAB (Chapter 2: section 2.9.8) indicate grain storage.

One hundred and forty-three sealings or sealing-related objects were excavated in phase 9: 47 impressed sealings, 16 incised sealings and 80 sealing-related objects (Murray 2011: 167). The sealings contain only Khafre’s or Menkaure’s Horus names: Userkaf is notably absent (Murray 2011: 167). Sealings made with impressions from Official Seals outnumber those with impressions made by Informal Seals (Murray 2011: 167). This is a departure from the trend in the ratio of Formal to Informal sealings observed in earlier phases (Murray 2011: 167).

Additionally, the majority of sealings (56) were identified as having secured either jars or possible containers, which continues the trend observed in phases 7 and 8 (Murray 2011: 167). Some sealings also closed other types of containers and doors; however, not all of these had impressions or incisions (Murray 2011: 167). The discovery of sealings without

markings matters because it suggests containers and doors were closed without identification and the associated responsibility at the RAB. Closing doors, in particular, is often thought to be a formal and authoritative practice (Smith 2018: 309); however, door sealings without impressions suggest this practice was more about the act of closing and securing the area than about who was responsible for it. The discovery of sealings without impressions is also important because these objects are not well documented in the archaeological record: bits of clay without markings have been poorly recorded and possibly even missed during excavation.

3.2.3 Gallery Complex

A group of sealings and sealing-related objects was excavated in Gallery Complex. Forty-two sealings were excavated in Gallery III.4 (Nolan 2007b). They were discovered in mudbrick tumble that was interpreted as a secondary dumping event (Nolan 2007b: 275). Most sealings contained impressions (14) or incisions (24), but four were unmarked (Nolan 2007a: 275). Several Formal Sealings were excavated; however, they were too fragmentary for names or titles to be deciphered (Nolan 2007b: 275). An additional 27 sealing-related objects were dug in the same mudbrick tumble of Gallery III.4 (Nolan 2007: 275).

Several sealings were also excavated in Gallery Set II and in both North Street Gatehouse and Main Street Gatehouse. This indicates some administrative activity occurred in these areas as well as other areas in the Gallery Complex (Nolan 2007b: 271).

Main Street also yielded 20 sealings (Nolan 2007a: 179). Three sealings bear impressions of *serekhs*; however, the royal names are illegible (Nolan 2007a: 179). One

sealing also contains the hieroglyphs for *hrt-ꜥ*, which translates to “box for documents” and suggests boxes carrying papyrus were sealed as part of the administrative activity in this area (Nolan 2007a: 180, 181).

3.2.4 East of Galleries (Bakery A7)

Forty-two sealings were excavated in Bakery A7 in East of Galleries (Nolan 1998: 5). Many bear impressions of either Khafre’s or Menkaure’s Horus name and suggests this area was occupied in the mid-4th Dynasty (Nolan 1998: 5). Ceramic evidence supports this conclusion (Wodzinska 2007c).

Several sealings also contain impressions with the title “Controller of Prophets” (Nolan 1998: 5). Nolan (1998: 5) notes this is a priestly title but does not elaborate. “Controller of Prophets” is not well known in the literature on Old Kingdom administration: Baer (1960), Strudwick (1985), Baud (1999) Jones (2000) and Moreno-Garcia (2013) do not mention it in their comprehensive works on the subject⁵⁶. The archaeological evidence excavated in Bakery A7 (Chapter 2: section 2.9.6) does not necessarily shed light on this administrative title and the role of “Controller of Prophets” in the administrative landscape at Giza, but it does suggest this individual was associated with (e.g. received items from or sent items to) the bakeries in this part of Heit el-Ghurob.

One sealing also bore an impression with the title “Sealer of the Magazine” (Nolan 1998: 5). This title likely refers to an individual responsible for securing the storerooms and

⁵⁶ This title appears in the Abusir Papyri (Doc. 17a) (Moreno-Garcia 2007: 128; Posener-Krieger 1976: 472-473).

is unique among the corpus of titles found on sealings excavated in the Heit el-Ghurob (Nolan 1998: 5). The title “Seal(er) of the Storehouse” appears on sealings excavated in Area AA; however, without knowledge of the hieroglyphic text of the sealing excavated in Bakery A7, which has not been published, it is impossible to determine whether these titles are the same or even whether they refer to the same administrative office.

Several sealings also preserved impressions with Informal glyptic. Nolan (1998: 6) notes one sealing bore an impression with a scorpion and backward-glancing gazelle but does not describe the other images or impressions. Both the scorpion and gazelle have long been used in seal imagery, with the earliest evidence of them having been found in seal impressions on many sealings excavated in Tomb U-j at Abydos (Hartung 1998); nevertheless, their function and significance within the context of Bakery A7 remain a mystery.

A few sealings also bore incised marks (Nolan 1998: 6). Neither the markings nor the object impressions they contain are described in detail.

3.2.5 Eastern Compound (Bakery A8)

Only nine sealings were excavated in Bakery A8 (see map 3.6). Their impressions were badly eroded; however, Khafre’s Horus name in a *serekh* could be read on one impression (Nolan 1998: 4, 6). This indicates Eastern Compound functioned during Khafre’s reign in the mid 4th Dynasty. The preponderance of 4th Dynasty ceramics within nearby Gallery Complex (Wodzinska 2007a; 2007b) and throughout Heit el-Ghurob (Wodzinska

2007c), and the large number of sealings with impressions containing Khafre's and Menkaure's Horus names in Heit el-Ghurob, support this conclusion.

At least one sealing also bore hieratic incisions (Nolan 1998: 6). Nolan (1998: 6) suggests the markings are similar to those found on sealings excavated in East of Galleries (Bakery A7) but does not provide a description of them. Their similarity is nevertheless significant because it suggests a possible connection between the two baking areas despite their being located in separate areas of Heit el-Ghurob.

3.2.6 Eastern Town

An unknown number of sealings and sealing-related objects were also excavated in Eastern Town (Nolan 2007: 271). Just under 50% of them were incised with hieratic marks. Neither the marks nor the object impressions the sealings contain are described in detail. An additional 33 sealing-related objects (e.g. cores, blanks) were also identified in this corpus. These together indicate sealing production occurred within Eastern Town.

3.3 Gebel el-Quibli

A couple hundred sealings have been excavated at Gebel el-Quibli⁵⁷. Formal and Informal glyptic as well as Hieratic incisions were identified in the corpus. Several with Formal glyptic contain Khufu's and Khafre's Horus names (Kromer 1978: 90-99, pl. 38-40) and indicate the sealings were produced in the early 4th Dynasty.

⁵⁷ Kromer (1978) excavated 178 sealings in the mid 1970's. The AERA team (Lehner et al, 2018a; 2018b) recently returned to re-excavate the site and publish preliminary articles on their findings.

Some Formal sealings indicate a connection with Pottery Mound. Sealings impressed by Seal 1 were excavated in Gebel el-Quibli, and many sealings excavated here bear impressions with “Scribe of Royal Documents” and “Scribe of the King’s Writing Case” (Witsell 2018: 4, 6). Seal 1 and sealings with these titles were also excavated in Pottery Mound (see section 3.1.1).

Other sealings suggest a connection with Area AA. Several sealings excavated at Gebel el-Quibli contain “Seal(er) of the Storehouse” in their impressions, and this title was also found on sealings excavated in Area AA (see section 3.2.1). The sealing evidence excavated at Gebel el-Quibli overall indicates a relationship between this site and Heit el-Ghurob.

In addition, several priestly titles were identified in the glyptic corpus. Both *hm-ntr* and *wꜥb* occur frequently. *Hm-ntr* means “god’s servant” and translates to either prophet or priest (Spencer 2010: 257). This office is well-known from the pharaonic period, and the *hm.w-ntr* typically served in the cults of deities or kings (Spencer 2010: 257). *Wꜥb* means “pure one” and often translates to, specifically, *wꜥb* priest (Spencer 2010: 257). The *wꜥb.w* often served in the same cults as the *hm.w-ntr* but are frequently considered to have been of lower rank than the *hm.w-ntr* (Spencer 2010: 257).

Fifty-three sealings were also inscribed in hieratic (Torcia 2007: 1818). One sealing is particularly interesting because it bears both a seal impression and a hieratic incision (Torcia 2007: 1820). The impression’s inscription describes an agreement between an unknown

official and a carpenter about building on royal land, and it names *Kꜣ-m-nfr.t*⁵⁸ as the carpenter in hieratic (Torcia 2007: 1820). Both the format and the content of this sealing are unique among the Giza sealing corpora.

An additional 104 sealings bear impressions of Mesopotamian-like imagery (Torcia 2007: 1818). Torcia (2007) has drawn her conclusion about these impressions based on her experience studying the impressed sealings excavated at Uruk (Torcia 1991a) and Tepe Gawra (Torcia 1991b). If correct, this is significant and indicates the exchange of goods between Lower Egypt and the Near East.

Finally, Torcia (2007: 1818-1819) identified a variety of sealing types in the Gebel el-Quibli corpus. These include bag sealings, box sealings, door sealings, large and small jar sealings, and papyrus sealings (Torcia 2007: 1818-1819). These types of sealings suggest activity related to the transport and storage of various items occurred frequently at Giza.

3.4 Khentkawes Town

Sealings have also been excavated in Khentkawes Town (Nolan 2013). Several contain impressions with the names of the rulers Menkaure, Userkaf, Sahure and Neferirkare (Nolan 2013: 13). The latter 3 kings reigned in the early 5th Dynasty and indicate Khentkawes Town functioned for an extended period of time from the mid-late 4th to the early 5th Dynasty. Both jar and papyrus sealings have been identified among the sealings excavated at

⁵⁸ The “t” at the end would usually designate a woman; therefore, it is possible the carpenter is a woman.

this site (Nolan 2013: 14). These discoveries suggest several different sealing activities were associated with this area, including, perhaps, the storage and transportation of items in jars.

3.5 Silo Building Complex

Roughly 400 sealings and sealing-related objects were excavated in Silo Building Complex (AR 2013-2014: 8). Seventy-five sealings were impressed with the Horus names of Menkaure, Userkaf, Sahure, Raneferef and Niuserre (AR 2013-2014: 8). This indicates either SBC functioned from the late 4th through mid-5th Dynasties or SBC was active during the 5th Dynasty, and Menkaure's sealings are from an earlier building lying beneath SBC (AR 2013-2014: 8, see Chapter 3: section 3.4). One sealing is particularly interesting because it contains Niuserre's Horus name next to the inscription "Overseer of the Pyramid, Great is Khafre," which is the name of Khafre's mortuary temple (AR 2011-2012: 9; Nolan 2012: 3-4). This evidence suggests Niuserre returned to SBC to revitalize Khafre's funerary cult (Nolan 2012: 3).

Approximately 20% of the sealings with discernible reverse impressions secured jars, and nearly 50% were attached to peg and string devices (AR 2013-2014: 8). The latter likely closed openings at the bottom of the silos and indicate access to whatever items or materials were stored inside them was limited (AR 2013-2014: 8). A further (less than) 5% of the sealings secured papyrus rolls, indicating papyri were either sealed or unsealed at SBC (Nolan 2013: 14).

Sealing-related objects were also excavated in SBC (AR 2013-2014: 8). These include both blanks and primed bits of clay for sealing (AR 2013-2014: 8). The latter appear

crumpled, suggesting they were applied to objects but deemed unsuitable and discarded (AR 2013-2014: 8). The presence of sealing-related objects suggests SBC functioned as a hub of sealing activity for the production of sealings and for the storage, transportation and reception of goods (AR 2013-2014: 8).

3.6 Menkaure Valley Temple

Reisner (1931) excavated numerous sealings north of his “First Temple” area along with Egyptian alabaster, pottery, flint tools, animal bones, ash charcoal, worked stone, pigment, wood, and metal (AERA Blog 2019). Several sealings bear the Horus names of Khafre, Menkaure, Shepsekaf, Niuserre, Isesi, Teti and Pepi I (AR 2011-2012: 12; Nolan 2012: 3). Nolan (2012: 3) interprets the sealings with Niuserre’s name in addition to other archaeological finds as evidence for a revival of Menkaure’s funerary cult during the mid-5th Dynasty.

Sealings excavated in Menkaure’s Valley Temple also bear incised marks in hieratic (Nolan 2012: 3; 2013: 20). These were most likely used to administer Menkaure’s Valley Temple and funerary cult. Royal funerary cults often endured for decades after the pharaoh died (Vymazalova 2013: 182), and this is indicated by the occurrence of names of post-Menkaure pharaohs in the seal impressions.

Sealings were used in Valley Temple administration to secure magazine doors, store offerings and other goods and seal containers with goods inside them. Seal impressions were further used to identify the administrator, by rank and sometimes by name, responsible for a particular area of administration and the king under which he served (Vymazalova 2013:

187). The incised marks are more enigmatic because a systematic study of them, both those from Menkaure's Valley Temple and those from elsewhere in Egypt, has yet to be undertaken. Together with the seal impressions, they may indicate two different forms of communication – formal and informal or shorthand – in the administration of Valley Temples; however, further work is required to verify this suggestion.

Recent excavations by the AERA team revealed additional sealings (AR 2018-2019: 7). They are still in the process of being studied and analyzed; however, the majority appear to be impressed with stamp seals rather than cylinder seals (AR 2018-2019: 7). This occurrence is unique among the other sealing corpora at Giza⁵⁹ but makes sense within the context of MVT. Stamp seals became popular by the end of the Old Kingdom (Wegner 2018), and the sealings containing Isesi's, Teti's and Pepi I's names indicate MVT clearly functioned during this period.

Conclusion

A large number of sealings and sealing-related objects were excavated at Giza. Most contain seal impressions with either Formal or Informal glyptic, but some also bear incisions made with styli. A variety of different sealing types were also identified within the corpus. These include bag sealings, basket sealings, box sealings, door sealings, jar sealings, papyrus sealings and peg-and-string sealings. The evidence for sealing administration at Giza during the Old Kingdom is significant, and the sealings and sealing-related objects excavated at Pottery Mound can be analyzed using communities of practice theory.

⁵⁹ Only nine sealings excavated in Heit el-Ghurob bear stamp seal impressions (Nolan 2010: 76).

Chapter 4: The Community of Sealing Practice at Pottery Mound

This chapter presents my analysis of the sealings excavated at Pottery Mound. Basic statistical methods are employed to explore various trends in the data, and communities of practice theory is then utilized to interpret these findings.

4.1 Methods

In an attempt to address the issue of how to correlate the archaeological deposits and data of Pottery Mound with the lived experience of the sealers who worked (and perhaps lived) in House Unit 1, I confined my analysis to artifacts excavated in Layer VI. This narrows the period under examination from that represented by the entire Pottery Mound corpus (i.e. all of the impressed sealings excavated in Layers III, IV, V, VI and VII) to that represented only by Layer VI. The archaeology of Pottery Mound further indicates Layer VI was the result of a single dumping event, which suggests the artifacts and materials excavated in it were collected at one time in and around House Unit 1 and then discarded together in Pottery Mound (Chapter 2: section 2.9). This indicates the impressed sealings were employed, either as closures on objects or as records of transactions, contemporaneously in House Unit 1, and that they would have been observed, and perhaps handled, by the sealers who worked there at a given time. This knowledge demonstrates these officials worked in the same physical environment (e.g. moved about within the same walls and among the same furniture, walked or perhaps sat upon the same ground, engaged with the same sealings, materials and other tools), which is important because this environment was fundamental to the sealers' shared lived experience.

Additionally, the seal impressions excavated at Pottery Mound suggest the period of time represented by the Layer VI materials was short. The glyptic excavated in Layers III, IV and V contain only examples of Khafre's serekh name, which indicates the originating seals functioned during his reign. The seal impressions excavated in Layer VI includes examples of both Khafre's and Menkaure's serekh names, but this does not mean the originating seals were employed in both kings' reigns because a ruler's serekh name was only used while he was alive. This evidence suggests either 1) the Layer VI artifacts were used during a transitional period between these two kings' reigns, at which point the sealers who owned seals with Khafre's name had not yet been issued new seals with Menkaure's serekh name, or 2) they were employed at the beginning of Menkaure's reign, and the seal impressions with Khafre's serekh name were left over from an earlier period of use.

Further, a greater number of seal impressions with Menkaure's serekh name (249) than with Khafre's serekh name (174) were excavated in Layer VI; however, the sealers who produced the largest number of impressed sealings on average owned seals with Khafre's serekh name. Seven sealers owned seals with Khafre's name and 13 sealers owned seals with Menkaure's name. This indicates the former sealers impressed an average of roughly 25 sealings and the latter an average of roughly 19 sealings, which, taking the potential lack of preservation in the archaeological record into account, suggests the sealers who owned seals with Khafre's serekh name were more active, albeit not to a great extent. This indicates that the sealers with either Khafre's or Menkaure's serekh names were active at the same time and plausibly suggests the Layer VI materials functioned during a transitional period between these two kings' reigns (Chapter 2: section 2.9). The evidence does not support the discovery of a narrower period of time than this transitional phase, but it likely occurred over a very

short period of time, perhaps only a year or more or even a several months and would have resulted in a shared lived experience for the sealers.

4.2 Community and Mutual Engagement

The community in communities of practice theory is the people involved in the practice and their relationships (Introduction). It is comprised of persons who work together, both as individuals and as a collective, and who share a lived experience.

In the following sections, I identify individual sealers from their seal impressions and reconstructions of their seals (4.2.1) and examine other characteristics (e.g. kings' served, official designations) they had in common (4.2.2). These people would have worked in House Unit 1, likely during the same period of time, and shared the lived experience of this environment.

4.2.1 Pottery Mound Sealers

First, I analyze seal impressions and determine how many unique seals can be identified within the glyptic corpus (section 4.2.1.1). Next, I discuss whether these seals can be said to legitimately represent individual sealers, and, if so, conclude how many sealers are represented among the unique seals (section 4.2.1.2). Finally, I describe the individual sealers who were active in the sealing administration near Pottery Mound (section 4.2.1.3).

4.2.1.1 Seal Impressions to Seals

In his original analysis of the Pottery Mound glyptic, Nolan (2010: 247) identified between 31-74 unique seals. He (2010: 133) reasoned each sealing bore seal impressions from only one original seal based on the nearly complete lack of evidence for the practice of “countersealing” in the Old Kingdom. Countersealing is impressing a sealing with two or more different seals (Beuthe 2016: 189). This was ostensibly done to add an extra layer of security and authentication. Beuthe (2016: 203-211) recently surveyed sealing evidence from the early periods of Egyptian history and confirmed the practice of countersealing nearly died out after the 3rd Dynasty⁶⁰. Knowing whether the sealing was impressed by one or multiple seals impacts how the original seal(s) is reconstructed: if only one seal impressed the sealing, then all visible glyptic signs belong to the same glyptic pattern and original seal.

Nolan (2010: 135) also reasoned each original seal bore only one type of *serekh* based on his analysis of Kaplony’s (1977) survey of Old Kingdom seals. This assumption is based on his analysis of *serekh* bases (i.e. palace facades) in Kaplony’s (1977: 206-213) publication and his discovery of 1) several different types of *serekh* bases among Kaplony’s corpus of seals and 2) each seal bore *serekhs* with the same base. Nolan (2010) analyzed the Pottery Mound glyptic and identified 12 different types of *serekh* (distinguished by their bases). This further supports the notion that all sealings excavated at Pottery Mound were impressed by one originating seal because only one type of *serekh* was ever found in their impressions. He (2010: 130-248) then examined the glyptic on each sealing, sorted those with the same *serekh*

⁶⁰ Beuthe (2016: 211) only found 2 examples of countersealing: 1 sealing excavated in 4th Dynasty contexts at Buhen (Emery 1963: 119, fig. 2, A6-18) and several sealings excavated in 6th Dynasty contexts at Balat (Pantalacci 1996: 362). It is notable both contexts are from the periphery of the Egyptian Old Kingdom.

and similar glyptic and reconstructed each seal. This work resulted in between 22-27 Formal Seals and between 9-47 Informal Seals from the corpus of 1,036 impressed sealings⁶¹.

In general, I agree with Nolan's (2010) assessment of the seal impressions, but I argue all 27 (and not between 22-27) Formal Seals can be identified from the glyptic and differentiated from other seals on the basis of their unique glyptic patterns. Nolan (2010: 228) has reservations about the glyptic from sealing 3742 because the *serekh* is barely visible and might conceivably belong to another seal. I suggest it was produced by a unique seal because it contains a hieroglyph not seen elsewhere in the glyptic corpus. It contains the hieroglyph for *mr* with two crossing symbols (rather than the one crossing symbol as is seen in other glyptic) (Nolan 2010: 226). Nolan (2010: 228) also has concerns about the glyptic on sealings 2719, 2726, 2836 and 2838 because they all display Type 1 *serekhs*, and he suggests they may have only been made by two unique seals. I argue they were made by four different seals because they all contain glyptic elements not seen elsewhere in the glyptic corpus. Sealing 2719 bears Khafre's Horus name written vertically within the cartouche (Nolan 2010: 216). All other instances of Khafre's name appear in horizontal formation. Sealing 2726 contains a quail chick to the bottom right of the *serekh* (Nolan 2010: 218). No other sealings with Type 1 *serekhs* contain quail chicks in the same location. Sealing 2836 bears a unique combination of *serekh*, titles and epithets that is not observed in other glyptic (Nolan 2010: 219). Sealing 2838 contains both a Type 1 *serekh* and vertical cartouche with Menkaure's name (Nolan 2010: 220). No other seal impressions contain both of these elements. Nolan (2010)

⁶¹ Incised sealings were not included in the original analysis, but no explanation was given. I examined photographs of the incised sealings with the naked eye and determined not enough glyptic remained to be of use in reconstructing individual seals based on Nolan's method. Perhaps future analyses will make use of RTI and other imaging technology to develop more complete images of the sealings' glyptic.

illustrates his concerns, but the evidence and his own work indicate 27 different seals impressed the 443 Formal Sealings in the Pottery Mound corpus.

I also argue the evidence indicates at least six Informal Seals can be identified in the Informal glyptic corpus. This differs from Nolan's (2010) conclusion of between 9-49 Informal Seals because I think many of the sealings bear impressions too illegible or uncertain to identify them as unique. The following sealings contain glyptic with enough visibility to conclude they were impressed with different seals.

Sealings 2811 and 2941 were likely impressed with the same unique seal because they bear impressions with the rank "Assistant" and the personal name "Iryumeru" (Nolan 2010: 232). No other sealings bear glyptic with both the described rank and personal name. Sealing 2840 was also likely impressed by a unique seal because it contains the title "sealer of the storehouse" together with a graphical element and vertical dividing lines. This combination of glyptic elements is unique among the Informal Sealings excavated at Pottery Mound and indicates the sealing was impressed by a second, unique Informal Seal. Sealing 2752 bear impressions with a row of quail chicks on a shared ground line (Nolan 2010: 234). This glyptic pattern is not visible on any other seal impressions; therefore, I argue it was made by a unique seal. Sealing 2871 contains two impressions of quadrupeds walking in rows on ground lines (Nolan 2010: 234). Other seal impressions bear four-legged animals walking in rows but not on ground lines; therefore, this glyptic pattern is unique and was almost certainly made by a unique seal. Both sealings 2711 and 4434 contain cross-hatched patterns: one crudely executed (sealing 2711) and the other finely executed (sealing 4434) (Nolan 2010: 235). No other seal impressions contain cross-hatched patterns, and the quality of patterns clearly differs; therefore, two different seals impressed these sealings. Nolan (2010)

vacillates between the number of seals likely to have impressed Informal Sealings, but this evidence indicates six different seals impressed seven Informal Sealings, and the remaining 42 Informal Sealings bear too little glyptic information to use to identify any further unique seals with certainty. Therefore, I conclude 33 Formal and Informal Seals may be identified in the Pottery Mound sealing corpus (see tables 4.1 and 4.2), and 28 Seals may be identified from the seal impressions excavated in Layer VI.

4.2.1.2 Seals to Sealers

Each of the Formal and Informal Seals identified in 4.1.a.i may be said to represent an individual sealer. It is logical to assume one Formal Seal corresponds to one person because only one person can hold the unique combination of titles and epithets on a given seal at one time. It might have been possible for certain sealers who were active during Khafre's reign (e.g. the sealers who owned Seals 1, 3, 5) to have been granted new seals with the same titles and epithets during Menkaure's reign (e.g. Seals 2, 4, 6), but neither the titles nor the stratigraphic association of seal impressions indicates this transference occurred. This indicates 24 different sealers engaged in administrative sealing during the period corresponding with Layer VI of Pottery Mound.

Each Informal Seal may also be said to represent an individual sealer. Seals 28 and 29 (sealings 2811 and 2941 and sealing 2840, respectively) bear unique text with titles and ranks, and this evidence indicates they were used in the official sealing administration (likely as *Beamtensiegel* or Official's Seals)⁶².

⁶² These seals are classified as Informal rather than Formal even though I argue they contain titles that indicate their sealers worked for the central administration because they do not contain *serekhs*, and they do contain graphic elements in addition to text.

The identification of sealers with Informal Seals 30 and 31 is more difficult to prove. A sealer who worked for the central administration would not have two Formal Seals, but he might have a Formal Seal for official business and an Informal Seal for personal business. This question is complicated by the excavation of both domestic and professional space in House Unit 1 (Chapter 2: section 2.9.10) because it suggests personal administration functioned alongside government administration.

However, the glyptic of the Informal Seals sheds light on this issue. Seals 30 and 31 contain combinations of graphic elements noted elsewhere (e.g. Kaplony 1978). Similarities in cross-hatching, quadrupeds and geometric motifs among seal patterns excavated at Pottery Mound and excavated elsewhere in Egypt demonstrate the existence of a known graphic system. This glyptic evidence strongly indicates Seals 30 and 31 belong to two sealers who are also distinct from Sealers 1-23, 25 and 28-29.

4.2.1.3 Individual Sealers

Sealer 1 is represented by Seal 1 and the 91 sealings impressed by it excavated at Pottery Mound (see table 4.1). This sealer owned a seal bearing Khafre's Horus name (*Wsr-ib*: Strong-hearted) in a Type 1 *serekh*, the titles "Keeper of Royal Instructions" and "Scribe of Royal Documents," and the epithet "he of making things right."

Sealer 2 is represented by Seal 2 and the 67 sealings impressed with it excavated at Pottery Mound (see table 4.1). This sealer owned a seal containing Menkaure's Horus name (*Kꜣ-ht*: Bull-bodied) in a Type 2 *serekh*, the titles "Scribe of Royal Documents," "Scribe of

Royal Documents for Royal Instructions” and “Scribe of the King’s Writing Case,” as well as the epithet “who executed the commands of Horus” (Nolan 2010: 156-157).

Sealer 3 is represented by Seal 3 and the 56 sealings impressed with it excavated at Pottery Mound (see table 4.1). This sealer had a seal with Khafre’s Horus name in a Type 1 *serekh*, the titles “Scribe of Royal Documents” and “Scribe of the King’s Writing Case,” and the epithet⁶³ “lord of the papyrus-roll⁶⁴.” The latter epithet likely indicates Sealer 3 was in charge of either a specific papyrus-roll or managed papyrus-rolls in some way⁶⁵. A survey of Old Kingdom titles and epithets (Porter and Moss 1974; 1981; Jones 2000; Piacentini 2002) indicates this particular epithet was not common during this period, and the uniqueness of “lord of the papyrus-roll” serves to distinguish Sealer 3 from other sealers at Pottery Mound and other officials in the central administration in Egypt.

Sealer 4 is represented by Seal 4 and the 41 sealings impressed by it excavated at Pottery Mound (see table 4.1). This sealer owned a seal with Menkaure’s Horus name in a Type 2 *serekh*, the titles “Scribe of Royal Documents,” and “Scribe of the King’s Writing Case” and the epithet “the one who executed the command of the King of Upper and Lower Egypt” (Nolan 2010: 170-171).

⁶³ It is unclear whether “lord of the papyrus-roll” is an epithet or an official title. A survey of offices (in Porter and Moss 1974; 1981; Jones 2000; Piacentini 2002) did not indicate it was a title; therefore, it has been classified as an epithet.

⁶⁴ *Mḏꜣt* can be translated as “papyrus-roll” (CDME: 123), “book” (Piacentini 2002: 763) or “book-roll” (Nolan 2010: 169). These terms generally mean the same thing (i.e. a collection of papyrus documents), but I prefer “papyrus-roll” because the hieroglyph for *mḏꜣt* is a tied papyrus roll; thus, “papyrus-roll” appears to be more accurate.

⁶⁵ The *mḏꜣt-pr* can be translated as “House of the Papyrus-Roll” and has been interpreted as an official Archive (Piacentini 2002: 763). It is possible Sealer 3 worked in the Archive in either a formal or informal capacity.

Sealer 5 is represented by Seal 5 and the 32 sealings impressed by it excavated at Pottery Mound (see table 4.1). This sealer owned a seal containing Khafre's Horus name in a Type 3 *serekh*, the title "Scribe of Royal Documents," and the epithet "the one of making things right for King of Upper and Lower Egypt" (Nolan 2010: 174-175).

Sealer 6 is represented by Seal 6 and the 31 sealings impressed with it excavated at Pottery Mound (see table 4.1). This sealer's seal bore Menkaure's Horus name in a Type 1 *serekh*, the titles "Scribe of Royal Documents," "Scribe of Royal Documents and of the King's Ebony Writing Case," and "Scribe of Royal Documents for Royal Instructions," and the epithet "preferred one of his lord every day" (Nolan 2010: 178).

Sealer 7 is represented by Seal 7 and the 22 sealings impressed by it excavated at Pottery Mound (see table 4.1). This sealer had a seal with Menkaure's Horus name in a Type 1 *serekh*, the titles "Scribe of Royal Documents" and "Scribe of the King's Writing Case," and the epithets "who is under the sunshade"⁶⁶ and "who makes right the judgment" (Nolan 2010: 183). Both epithets are unique among the Pottery Mound glyptic corpus and distinguish Sealer 7 from the other sealers at Pottery Mound.

Sealer 8 is represented by Seal 8 and the 22 sealings impressed by it excavated at Pottery Mound (see table 4.1). This sealer owned a seal with Menkaure's Horus name in a Type 7 *serekh*, the titles "Scribe of Royal Documents," "Scribe of the King's Writing Case" and "Scribe of Royal Documents for Royal Instructions," and the epithets "wall-builder," "lord of the commands" and "preferred of his lord." The epithets "wall-builder" and "lord of

⁶⁶ For an in-depth discussion of this particular epithet, see Nolan 2010: 185-193.

commands” are unique among the Pottery Mound corpus and distinguish Sealer 8 from other sealers at Pottery Mound.

Sealer 9 is represented by Seal 9 and the 21 sealings impressed with it excavated at Pottery Mound (see table 4.1). This sealer owned a seal with Menkaure’s Horus name in a Type 4 *serekh*, the titles “Scribe of Royal Documents” and “Scribe of Royal Documents for Royal Instructions” and the epithet “Beloved of his Lord.”

Sealer 10 is represented by Seal 10 and the 16 sealings impressed by it excavated at Pottery Mound (see table 4.1). This sealer had a seal with Menkaure’s Horus name in a Type 6 *serekh*, the titles “Scribe of Royal Documents,” “Scribe of the King’s Writing Case” and “Judge and Scribe Concerning the *Īꜥḥ* and the epithets “who executed the commands” and “preferred of his lord” (Nolan 2010: 203-204).

Sealer 11 is represented by Seal 11 and the 16 sealings impressed with it excavated at Pottery Mound (see table 4.1). This sealer owned a seal bearing Menkaure’s Horus name in a Type 8 *serekh* and the title “Scribe of Royal Documents for All Royal Works” (Nolan 2010: 208).

Sealer 12 is represented by Seal 12 and the nine sealings impressed with it excavated at Pottery Mound (see table 4.1). This sealer had a seal with Menkaure’s Horus name in a Type 9 *serekh*, the titles “Scribe of Royal Documents” and “Scribe of Royal Documents and of the King’s Writing Case” and the epithet “the one who makes right the commands of Menkaure” (Nolan 2010: 210-211).

Sealer 13 is represented by Seal 13 and the two sealings impressed by it excavated at Pottery Mound (see table 4.1). This sealer owned a seal with a Type 8 *serekh*, the hieroglyphs transliterated as *sb3.wt*, and an incomplete epithet. *Sb3.wt* may refer to “instructions” in this context, and this seems likely given that titles related to “royal instructions” appear frequently in the Pottery Mound corpus.

Sealer 14 is represented by Seal 14 and the two sealings impressed with it excavated at Pottery Mound (see table 4.1). This sealer had a seal with Menkaure’s Horus name in a *serekh*, the title “Scribe of Royal Documents for Royal Works,” and the epithet “Beloved of His Lord.”

Sealer 15 is represented by Seal 15 and the three sealings impressed with it excavated in Pottery Mound (see table 4.1). This sealer owned a seal with Khafre’s Horus name in a Type 8 *serekh* and a vertical line left of the *serekh* (Nolan 2010: 215-216).

Sealer 16 is represented by the impressions sealing 3265 (see table 4.1). This sealer owned a seal bearing a Type 11 *serekh* with Menkaure’s Horus name.

Sealer 17 is represented by the impression on sealing 2726 (see table 4.1). This sealer had a seal with a Type 1 *serekh*, the title “Scribe of Royal Documents,” and a quail chick to the bottom right of the *serekh*.

Sealer 18 is represented by impressions on sealing 2784 (see table 4.1). This sealer owned a seal with a Type 12 *serekh* bearing Khafre’s Horus name as well as the title “Scribe of Royal Documents.”

Sealer 19 is represented by impressions on sealing 2838 (see table 4.1). This sealer had a seal with a Type 1 *serekh* and Menkaure's name in a cartouche. Menkaure's Horus name likely adorned the *serekh* because his name was found in the cartouche.

Sealer 20 is represented by the impressions on sealing 2878 (see table 4.1). This sealer owned a seal with a cartouche, the titles "Son of the King's Body"⁶⁷ and "Prophet of Hathor" and the epithet "Worshipper of Hathor" (Nolan 2010: 223). A survey of Old Kingdom titles (e.g. in Porter and Moss 1974; 1981; Jones 2000; Piacentini 2002) indicates "Prophet of Hathor" was not a common title during the Old Kingdom. The only two examples of it are recorded: a likely 5th Dynasty inscription in Nebunisut's tomb at Dendera (Kitchen 1972: 122) and a 6th Dynasty inscription in Meru Tetiseneb's tomb (G.Sa.26) at Saqqara (Piacentini 2002: 578). These give no indication as to the specific duties performed by a Prophet of Hathor; however, the title clearly indicates Sealer 20 served in the cult of Hathor. Both Son of the King's Body and Prophet of Hathor are unique and distinguish Sealer 20 from the other sealers at Pottery Mound.

Sealer 21 is represented by the impressions on sealing 3561 (see table 4.1). This sealer had a seal with Khafre's Horus name in a likely Type 9 *serekh*.

Sealer 22 is represented by the impression on sealing 2719 (see table 4.1). This sealer owned a seal with Khafre's Horus name in a Type 1 *serekh* and the epithets "who satisfied Khafre," "the one who executed the commands and judgements" and "Preferred of His Lord"

⁶⁷ "Son of the King's Body" indicates this sealer was a royal prince and second in the hierarchy (after the king) of the central administration (Nolan 2010: 224).

(Nolan 2010: 217). “Who satisfied Khafre” is unique among the Pottery Mound epithets and distinguishes Sealer 22 from the other sealers at Pottery Mound.

Sealer 23 is represented by impressions on sealing 2797 (see table 4.1). This sealer had a seal with a Type 10 *serekh* containing Menkaure’s Horus name.

Sealer 25 is represented by impressions on sealing 3742 (see table 4.1). This sealer had a seal with the *mr* hieroglyph with the double crossing symbol (Nolan 2010: 226). This can translate to “love” but cannot be used to suggest an epithet (or even a possible personal name) because the other glyphs and graphic signs are too abraded to read or interpret.

Sealer No. 28 is represented by impressions on sealings 2811 and 2941 (see table 4.2). This sealer owned a seal containing the partial titles “sealer” and “assistant” and the personal name “Iryumeru.” The inclusion of a personal name and the lack of a *serekh* with a king’s name suggests this seal functioned as a Beamtensiegel (i.e. Official’s Seal). Beamtensiegel were used mainly in the Early Dynastic period, although a few have been excavated in Old Kingdom contexts⁶⁸. Kaplony (1977: 5, 48) suggests they were used by individuals for securing private property, and their disappearance in the 4th Dynasty resulted from the central administration’s expansion. Pätznick (2005: 88) alternatively suggests Beamtensiegel were produced and used by local administrators to secure public property in the provinces. Nolan (2010: 67) argues their apparent disappearance may be due to a lack of excavated examples and uses the sealings excavated at Buhen as proof of their use in a local administration. I would disagree with this statement because the archaeological and historical evidence

⁶⁸ Kaplony (1977) discusses the rise and fall of the Beamtensiegel from the Early Dynastic period through the Old Kingdom. He notes (1977: 371-372) two Old Kingdom examples were excavated at Buhen.

suggests Buhen was administered by the central administration even if it was at the southern end of the Egyptian kingdom (O'Connor 2014). The discovery of a Beamtensiegels at Pottery Mound further supports this statement.

Sealer 29 is represented by the impressions on sealing 2711 (see table 4.2). This sealer's seal contains an irregular cross-hatched pattern, which is distinct among the graphic patterns impressed into sealings at Pottery Mound because of its crude execution.

Sealer 30 is represented by the impressions on sealing 2752 (see table 4.2). This sealer owned a seal with a row of quail chicks on the ground line. The meaning behind a row of quail chicks is not clear from either the seal or similar depictions on other seals; nevertheless, it is unique among the Pottery Mound glyptic and distinguishes Sealer 30 from other sealers at Pottery Mound.

Sealer 31 is identified through impressions on sealing 2840 (see table 4.2). This sealer's seal bore the title "Sealer of the Storehouse" (Nolan 2010: 231). This title is unique among the Pottery Mound glyptic corpus; however, similar titles (i.e. Seal of the Storehouse) were found on sealings excavated in Area AA (Chapter 3: section 3.2.1), Gebel el-Qibli (Chapter 3: section 3.3) and possibly Bakery A7 (Chapter 3: section 3.2.4).

4.2.2 Shared Characteristics

This section examines several different connections among the identified sealers. King's reigns (section 4.2.2.1), administrative offices (section 4.2.2.2) and personal epithets

(section 4.2.2.3) serve as points in common among the individual sealers⁶⁹. This section provides insight into the sealers' lived experiences that may have resulted from these shared characteristics.

4.2.2.1 Shared Kings' Reigns

Sealers worked in the sealing administration during both Khafre's and Menkaure's reigns. Sealers 1, 3, 5, 15, 18, 21 and 22 owned seals with Khafre's Horus name (*Wsr-ib*: Strong-hearted). This indicates they received their seals and worked in the sealing administration at Pottery Mound during Khafre's reign. Some or all of them likely worked at the same time given the plausibly short period of time that resulted in Layer VI (see Chapter 2: section 2.4; Chapter 4: section 4.1).

Sealers 2, 4, 6, 7, 8, 9, 10, 11, 12, 14, 16, 19 and 23 owned seals with Menkaure's Horus name (*Kꜥ-ḥt*: Bull-bodied). This indicates they received their seals and worked in the sealing administration at Pottery Mound during Menkaure's reign. Once again, some or all of them likely worked together at the same time due to the probable short period of time that resulted in Layer VI (see Chapter 2: section 2.4).

⁶⁹ It is interesting to note that no sealers with graphic seals shared graphic elements. The lack of significant numbers of preserved examples of graphic seal impressions in the Layer VI corpus may be the cause, but there could be another reason. Graphic elements may indicate an informal, and therefore uncoded, system of markings that were nevertheless used in institutional administration. Some evidence for this may exist in the published graphic glyptic excavated in other Old Kingdom contexts (e.g. see Kaplony 1978). Additional research into the frequency of shared, graphic elements on Old Kingdom seal impressions and seal glyptic is required to bear out this suggestion, but this work lies beyond the scope of this thesis.

4.2.2.2 Shared Administrative Offices

Many sealers who worked at Pottery Mound shared the same titles and may have shared related duties. Sealers 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 17 and 18 all bore the title Scribe of Royal Documents (*sš ʕ.w ny-sw.t*). Scribe of Royal Documents is well attested in the textual record of Old Kingdom Egypt⁷⁰, but the specific duties attached to this position are not well known. Scribes within the central administration likely wrote letters and decrees and recorded important events (Allon and Navratilova 2017: 1-2). “Royal Documents” could have been anything related to the king, palace or central government. What is known is that these sealers likely shared some of the same duties within the central administration because they all bore the same title.

Sealers 2, 3, 4, 6, 7, 8, 10 and 12 were all Scribes of the King’s Writing Case (*sš.w hry.t-ʕ ny-sw.t*). The specific duties associated with this office are not documented, but its frequency suggests this set of sealers engaged in some of the same duties. Sealer 6 was notably “Scribe of the King’s Ebony Writing Case,” and it may be that he was responsible for a writing case made in a specific type of material (i.e. ebony).

Sealers 1, 2, 6, 8, 9 and 13 bore titles related to Royal Instructions (*sbʕw.t ny-sw.t*). Sealer 1 was Keeper of Royal Instructions. Sealers 2, 6, 8 and 9 were Scribes of Royal Documents for Royal Instructions. Sealer 13 may have owned a related title because his seal contained “Instructions,” but the full office and his rank are unattested. They all likely

⁷⁰ Some examples include C.Gi.8-Giza (Piacentini 2002: 99-100), E.Gi.21-Giza (Piacentini 2002: 177-178), E.As.13-Abusir (Piacentini 2002: 348-349), E.Sa.12-Saqqara (Piacentini 2002: 422-423), G.Sa.73-Saqqara (Piacentini 2002: 633).

engaged in many of the same duties, but Sealer 1 may have had a higher rank because he was “Keeper.”

Sealers 11 and 14 both engaged in duties related to Royal Works (*kꜣ.t nb.t n.t ny-sw.t*). Sealer 11 was Scribe of Royal Documents for All Royal Works, and Sealer 14 was Scribe of Royal Documents for Royal Works. These sealers likely engaged in similar duties related to Royal Works, but Sealer 11 appears either to have had a higher rank or to have been responsible for significantly more projects (i.e. all of them).

4.2.2.3 Shared Epithets

Some of the sealers who participated in the sealing administration at Pottery Mound shared epithets and the associated distinction. Sealers 2, 4, 10 and 22 held epithets related to “who executed the commands.” This suggests these sealers were, in some way, responsible for carrying out their king’s orders.

Sealers 6, 8, 10 and 22 were considered “preferred of his Lord.” “His Lord” was likely the king, and these sealers shared the distinction of being favorites of the ruler.

Sealers 1, 5 and 12 bore the epithet “making things right.” What specifically these sealers made right is not clear; however, they share the distinction of handling business for the king.

Sealers 9 and 14 were considered “beloved of his lord.” This epithet clearly indicates both sealers found approval with the king and shared in this favor.

These analyses demonstrate that some of the sealers shared kings' reigns, institutional titles, and in many cases ranks, and personal epithets. They shed light on the sealers' lived experiences of the institutional hierarchy. The limited hierarchy of official positions (e.g. Scribe of Royal Documents, Scribe of the King's Writing Case) suggests a relationship of institutional equality for many sealers; however, an analysis of the data with communities of practice theory in the following sections may suggest an alternative dynamic complicated the relationships established by the official hierarchy.

4.3 Practice and Joint Enterprise

Sealing activity encompasses a broad spectrum of practices. Closing containers, doors and documents with sealings, impressing sealings with seals, reading or interpreting glyptic and making sealings are the main practices evident from the seal sealings and sealing-related objects excavated at Pottery Mound. Evidence for closing different objects exists in the variety of sealing types excavated in Layer VI at Pottery Mound: bag sealings, basket sealings, box sealings, door sealings, papyrus sealings and peg-and-string sealings. Data for impressing sealings and for reading or interpreting glyptic survives in the large number of impressed, and evidence for making sealings exists in the sealing-related objects.

In order to uncover and highlight significant patterns in the data, from the categories described above, with communities of practice theory, I employ basic statistical methods. I use the median, Q1, Q3 and outlier values to explore levels of sealing production and participation for the sealers who made sealings excavated in Layer VI. The median is the center value of the data, and it is the value under which 50% of data points are detected. The Q1 is the value under which 25% the of datum are found, and the Q3 is the value under

which 75% of the data points are detected. These values, as opposed to the mean and standard deviation, were chosen for statistical analysis because they provide better descriptions of the data's ranges and variability with samples that are skewed and include outliers (Leys et al, 2013: 765). An examination of my data revealed that some sealing categories contained outliers; therefore, I decided to use the described analytical approach in my analyses of all samples to promote consistency and to provide a better depiction of the data. It is assumed that the data for each category is a sample of the entire population, and this is validated by the knowledge that many of the sealings could not be classified by type and used in this analysis. Some of the categories analyzed yielded small sample sizes; therefore, they will be used to demonstrate how statistical methods can be used with communities of practice theory to explore participation levels but not to draw viable conclusions about the ancient sealers at Pottery Mound.

Participation levels is a key concept in communities of practice theory. To help describe these levels among sealers, I correlate the ranges among the median, Q1 and Q3 values with specific degrees of participation. The median value corresponds to the norm or the expected number of sealings produced for a given activity (e.g. box sealing, impressing sealings) and the norm degree of engagement in that activity. Values between the median and Q3 equate with slightly greater numbers of sealings than the expected number and a slightly higher level of participation. Values of Q3 or higher correspond to greater numbers of sealings and a greater degree of engagement. Outliers with values greater than the median constitute significantly greater numbers of sealings and significantly higher levels of participation. Values between the median and Q1 correspond to slightly fewer sealings than the norm and a slightly lesser degree of participation in the given sealing activity. Values of Q1 or lower correspond with fewer numbers of sealings and a lower level of engagement.

Outliers with values less than the median constitute significantly fewer sealings and a significantly lesser degree of participation. This method will demonstrate the patterns of variation in the sealers' participation levels for each category of sealing (e.g. bag sealing, box sealing) and its corresponding sealing activity, and the results will be used to explore the sealers' lived administrative experience relative to the institutional hierarchy (or lack thereof) Nolan (2010) documented with the text from the seal impressions. It also assumes a correlation between the number of sealings an individual sealer produced while participating in a given activity and that sealer's participation level in that activity. This assumption logical but neither validated nor invalidated by the data, and additional studies will be needed to confirm its applicability.

4.3.1 Closing Objects

One of the main sealing activities practiced at Pottery Mound was closing objects (e.g. containers, doors, papyri). It is clearly demonstrated by the 157 sealings, of identifiable type, excavated in Layer VI at Pottery Mound (table 4.3). A closing practice is a method sealers used to shut and secure objects with sealings. Different closing methods were sometimes used to secure the same object (Engel and Müller 2000). Closing practices can be identified through the reverse impressions and shapes of sealings. The specific types of sealings recognized at Pottery Mound include bag, basket, box, door, jar, papyrus, and peg and string devices. I categorize stoppers and toppers as types of jar sealings even though Nolan (2010: 86, table 1.1) created separate categories for them because these types of sealings were used to seal jars. Sealings of undetermined type were also recognized; however, they are not included in this analysis because they do not provide enough information about closing practices. Each sealing type, its associated practice, among which

sealers it was shared, and the dynamics among the people who participated in it are discussed in the following sections.

4.3.1.1 Closing Bags

Five bag sealings with seal impressions from identified sealers were excavated in Layer VI at Pottery Mound (table 4.3). They bear impressions of textile bunches and parallel strings on their reverse sides. Sealings with these impressions could be confused with indirect jar sealings, which are sealings attached to jars covered by textile and secured by string (Chapter 3: section 3.5). A sealing is a bag sealing rather than a jar sealing if the reconstructed diameter of the cord (identified in the reverse impression) is less than 10 cm and if the textile impressions (identified in the reverse impression) are gathered rather than smooth (Nolan 2010: 89-90). The impressions on the bag sealings indicate the sealings were most likely applied to the tops of bags on the outside after the bags had been tied with string.

The five bag sealings were produced by four different sealers. Sealers 1, 6 and 7 each made one sealing, and Sealer 8 made two sealings. This indicates that sealing bags was an activity shared by these sealers. Statistical analysis indicates a median value of 1, a Q1 value of 1, a Q3 value of 1.5 and no outliers. From a communities of practice perspective, this evidence indicates Sealers 1, 6, and 7 produced the norm number of bag sealings (i.e. one bag sealing each) and participated to the expected degree and to the same degree as each other. These values also indicate Sealer 8 produced one more sealing (i.e. two bag sealings) than the norm and participated in bag sealing to a greater degree than the other three sealers. Although the sample size is ultimately too small to validate these results, my work nevertheless

demonstrates how communities of practice theory can be applied to sealing data to discuss levels of participation among ancient sealers.

4.3.1.2 Closing Baskets

Only one example of a basket sealing was excavated in Pottery Mound, and it bears the impression of the regular weaving of fiber on its reverse side (table 4.3). These marks, rather than its shape, distinguish the basket sealing from other types of sealings excavated at Pottery Mound (Nolan 2010: 93). They also suggest the sealing was applied to the section where the lid and body joined in order to close and secure the container. Only one basket sealing indicates sealing baskets was neither common nor shared by the sealers working at Pottery Mound; however, this perspective may be altered by future findings of basket sealings⁷¹.

4.3.1.3 Closing Boxes

One hundred and nineteen box sealings with seal impressions from thirteen identified sealers were excavated in Layer VI at Pottery Mound (table 4.3). All have relatively flat back sides with impressions of wood grain across their backs and of multiple ropes on the outer sides of their backs. The rope impressions usually occur in pairs or in quads, which hints at the type of boxes being sealed and the methods used to seal them (Nolan 2010: 94). The sealings' shapes and impressions indicate ancient sealers closed flat-topped boxes at Pottery Mound by first securing the boxes with rope and then locking them by pressing sealings into

⁷¹ Some basket sealings may have been missed in the excavation and collection process. Additional basket sealings with seal impressions may change this perspective if multiple, unique seals (and sealers) could be identified in the glyptic.

the rope and down onto the tops or sides of the boxes. The flat shape of the sealings and the wood grain impressions indicate the sealings were placed on the flat surfaces of wooden objects, which Nolan designates as flat-topped, wooden boxes (see Nolan 2010: 287-298 for a discussion of the different types of flat-topped wooden boxes known from Old Kingdom Egypt). Why he thinks the sealings must have been applied to the boxes' lids rather than to the sides is not clear: perhaps he assumes the box tops, rather than the sides, were open and that this is the location sealers chose to seal. It is equally likely the sealings were applied to the flat sides of wooden boxes because they served the same function (i.e. to lock the strings securing the box) in either position. Whether the sealings were applied to the tops or to the sides of boxes is impossible to know because the box sealings do not bear recognizable marks identifying these areas of the boxes; however, this information does not greatly change our understanding of the practice of sealing boxes at Pottery Mound. Ancient sealers still closed boxes with rope and secured the rope by pressing a sealing against it into one of the box's flat surfaces. The multiple rope impressions on the sealings' sides additionally indicate the boxes were wrapped with rope several times before both rope and box were locked with a sealing. The uniformity in the shapes and impressions of box sealings excavated at Pottery Mound indicates they were made and affixed to boxes in the same way and by the same practice.

Thirteen different sealers made the 119 box sealings excavated in Layer VI. Sealer 1 produced 25 box sealings. Sealers 2 and 4 each made 18 box sealings. Sealer 6 produced 11 box sealings. Sealers 3 and 5 each made 9 box sealings. Sealer 10 produced 7 box sealings. Sealer 7 made 6 box sealings. Sealers 8 and 11 each produced 5 box sealings. Sealer 9 made 4 box sealings, and Sealers 13 and 14 each produced 1 box sealing. That several sealers produced multiple box sealings in the same environment and over a plausibly short period of time indicates closing boxes was an activity shared among the identified sealers.

Basic statistical analysis indicates the median value is 7, the Q1 value is 4.5, the Q3 value is 14.5 and that there are no outliers. From a communities of practice perspective, Sealer 10 produced the expected number (seven) of box sealings and was the only sealer to participate to the expected level. Sealers 3 and 5 each impressed two more box sealings than the norm, and Sealer 6 made three more than the norm, which indicates these three sealers participated in sealing boxes to a slightly greater degree than Sealer 10 (and the norm level of participation). Sealers 2 and 4 each produced 11 more box sealings than the expected number, and Sealer 1 impressed 18 more box sealings than the norm, which indicates these three sealers participated to a greater degree than Sealer 10 (and the expected level of participation). Sealer 7 produced one box sealing fewer than the norm, and Sealers 8 and 11 each impressed two sealings fewer than the expected number. This indicates these three sealers participated to slightly lesser degrees than Sealer 10. Sealer 9 produced three fewer sealings than the norm, and Sealers 13 and 14 each impressed six fewer sealings than the expected number. This indicates these three sealers participated to a lesser degree than Sealer 10. This statistical analysis does indicate the sealers who produced box sealings participated in this shared activity to different degrees, suggesting that communities of practice theory may be applied to larger datasets with viable results.

4.3.1.4 Closing Doors

Only two door sealings were excavated in Pottery Mound (table 4.3). A sealing was classified as a door sealing if, and only if, the impressions and shape indicated it closed a door and not a box or other object. This distinction is critical because it demonstrates local sealing activity. The two door sealings excavated at Pottery Mound bear impressions of door jambs, pegs and rope on their reverse sides (Chapter 3: section 3.1.3). Nolan (2010: 99) notes

peg-and-string devices could also be used to close and secure boxes; therefore, he only categorized sealings as “door sealings” if the diameter of the rope was greater than 3cm or if the sealing preserved the impressions of both the string and the wood grain or plaster pattern of the door jambs to which it was attached. Sealings not bearing these impressions were classified as generic peg-and-string sealings.

Sealer 3 impressed both door sealings; therefore, the data is not evidence for a shared practice of closing and securing doors with sealings among sealers working at Pottery Mound. Door sealings indicate access to and authority over the materials stored behind the door. The role of Sealer 3, as both the only sealer known to have closed doors, clearly indicates this individual held some power within the community of sealing practice at Pottery Mound.

4.3.1.5 Closing Jars

Eight jar sealings with impressions made by identified sealers were excavated in Layer VI at Pottery Mound: all were small jar sealings and were either direct or indirect sealings (table 4.3). Direct, small jar sealings were attached to the jar, but indirect sealings were attached to the fabric and rope securing the jar. The direct, small jar sealings are shaped like the vessels to which they are attached, and they bear the imprints of the vessels’ surfaces as well as of the strings and knots securing the vessels’ contents (Nolan 2010: 106). Several of the direct, small jar sealings also bear the impressions of ceramic lids on their backs (Nolan 2010: 106). The shape and impressions of this type of sealing indicate ancient sealers closed small ceramic vessels with rope and secured them with sealings they pressed against the rope. Small jar sealings with impressions of ceramic coverings indicate some sealers first

covered the mouths of the jars and then closed and secured the jars with ropes and sealings. The indirect, small jar sealings are also shaped like the vessels to which they were attached, but they bear the impressions of fabric and the strings or knots used to secure the fabric over the mouths of the jars (Nolan 2010: 106). They are often confused with bag sealings because the backs of both types of sealings bear impressions of string and textile or leather (Nolan 2010: 107). Sealings with both textile and string impressions were classified as indirect jar sealings only if they exhibited the shape of a ceramic vessel or if the reconstructed diameter of the string was greater than 10cm; otherwise, they were classified as possible container sealings (Nolan 2010: 107). This type of small jar sealing is called indirect because it does not lie directly on the vessel, but rather on the fabric or covering, but still closes and secures it. The shape and impressions of indirect, small jar sealings indicate ancient sealers first covered the mouth of a vessel with fabric and then secured the fabric with string and a sealing. The sealings do not provide evidence for why different practices for closing jars were employed; however, the logical explanation for different practices is differential access to resources and variations in the materials stored in the jars.

The eight jar sealings were produced by six different sealers. Sealers 1 and 2 each made two jar sealings. Sealers 3, 10, 16 and 28 each produced one jar sealing. This indicates closing small jars with sealings was a shared activity among these six sealers. Statistical analysis results in a median value of 1, a Q1 value of 1, a Q3 value of 2 and no outliers. From a communities of practice perspective, these values would indicate Sealers 3, 10, 16 and 28 produced the norm number of jar sealings (i.e. one sealing each) and participated to the expected degree and the same degree as each other. These values would also indicate Sealers 1 and 2 participated to the same extent as each other, produced one more jar sealing (i.e. two jar sealings each) than the expected number, and participated to a greater degree than Sealers

3, 10, 16 and 28. The small sample size may make these results unviable; however, that different sealers engaged in this shared activity, and that their respective degrees of participation can be examined, suggest ways in which communities of practice theory may be applied, with statistics, to sealing data in order to discuss ancient sealing practice.

4.3.1.6 Closing Papyrus Documents

Ten papyrus sealings were identified in Layer VI at Pottery Mound (table 4.3). Nine sealings are flat and disc-shaped with impressions of papyrus documents and string on their backs. Impressions of papyrus documents include imprints of the papyrus reeds used to make the document and sometimes also creases in the document if the document was folded prior to being closed. The impressions and shapes of these papyrus sealings indicate ancient sealers folded the documents, tied them with string and affixed the string to the documents by pressing a sealing down onto the string and into the papyrus. The large number of papyrus sealings formed using this method indicates it was preferred by sealers participating in the community of sealing practice at Pottery Mound.

One papyrus sealing (2878) excavated at Pottery Mound is half-barrel-shaped and bears the impression of papyrus and string. This sealing's shape and impressions suggest the papyrus was rolled, tied with a string and secured with a sealing. The only evidence for this practice exists in this one sealing; therefore, it was not a shared practice among the sealers at Pottery Mound.

The other nine papyrus sealings were made by nine different sealers. Sealers 3, 6, 8, 9, 11, 17, 18, 19, 21 and 23 each produced a papyrus sealing, indicating papyrus sealing was

a shared activity among these sealers. Statistical analysis is not necessary in this case to determine all sealers participated in sealing papyri to the same degree. Although the sample size is small and may make these results less viable, this work, nevertheless, demonstrates how communities of practice may be applied to explore relative levels of participation among ancient sealers with larger datasets of sealings.

4.3.1.7 Closing Peg-and-String Devices

Twelve peg-and-string sealings were identified in Layer VI at Pottery Mound (table 4.3). Peg-and-string sealings exhibit impressions of “regularly wound loops of string or cordage” (Nolan 2010: 110) and traces of wood grain on their reverse sides. Ancient sealers appear to have secured the peg-and-string device with a sealing by pressing the sealing onto the body of the peg after it had been secured to the object with string; thus, both the wood and the string are impressed into the sealings’ reverse sides. Peg-and-string devices closed and secured many different types of objects – bags, boxes, doors and windows; however, the practice of securing them with sealings would have been the same because the sealings secured the device rather than the object. The peg-and-string sealings excavated in Pottery Mound do not bear marks other than those described at the beginning of this paragraph; therefore, it is impossible to determine to what objects they were attached.

The twelve peg-and-string sealings were impressed by six different sealers. Sealer 3 produced four sealings. Sealers 2, 7 and 9 each made two sealings, and Sealers 8 and 14 each impressed one sealing. This evidence indicates sealing peg-and-string devices was a shared activity among these six sealers. Statistical analysis indicates the median value is 2, the Q1 value is 1, the Q3 value is 2 and the outlier is 4. From a communities of practice perspective,

these values indicate Sealers 2, 7 and 9 participated to the same degree and made the norm number of peg-and-string sealings (two sealings). They also indicate Sealers 8 and 14 participated to the same degree as each other, produced one fewer sealing (i.e. one peg-and-string sealing) than expected and participated to a lesser degree than Sealers 2, 7 and 9. These values further indicate Sealer 3 impressed two more sealings (i.e. four peg-and-string sealings) than expected and participated to a more significant degree than any of the other five sealers. The small sample size may make these results unviable, but the analysis still demonstrates how communities of practice theory can be applied with statistics to discuss levels of participation among ancient sealers with larger sealing datasets.

4.3.2 Impressing Sealings

Impressing sealings with cylinder seals is another activity visible in the sealings excavated at Pottery Mound. It requires an individual to press his or her seal into a prepared sealing and roll it across the sealing until the seal's pattern is discernible. Old Kingdom sealers often rolled their cylinder seals across the sealing several times and in different directions (e.g. Pätznick 2005). The numbers and directions of impressions are not recorded for the sealings excavated at Pottery Mound, but this information is not necessary for discussing whether the practice was shared because the method for impressing a sealing is the same whether it is done several times and in several directions or only once and in one direction.

Four hundred and thirty-three impressed sealings were identified in Layer VI at Pottery Mound, and they were produced by 28 different sealers. Sealer 1 made 86 different impressed sealings. Sealer 2 impressed 67 sealings. Sealer 3 impressed 53 sealings. Sealer 4

produced 41 impressed sealings. Sealer 6 made 31 impressed sealings. Sealer 5 impressed 30 sealings. Sealer 7 produced 22 impressed sealings. Sealers 8 and 9 each made 21 impressed sealings. Sealers 10 and 11 each impressed 16 sealings. Sealer 12 produced nine impressed sealings. Sealer 15 made three impressed sealings. Sealers 14 and 28 each impressed two sealings, and Sealers 13, 16, 17, 18, 19, 20, 21, 22, 23, 25, 28, 29, 30, 31 each produced one impressed sealing. This data indicates impressing sealings with cylinder seals was an activity shared among these 28 sealers.

Statistical analysis indicates the median value is 2, the Q1 value is 1, the Q3 value is 21.5 and the outliers are 53, 67 and 86. From a communities of practice perspective, this suggests Sealers 14 and 28 participated in impressing sealings to the same relative degree and at the expected level because they each produced two impressed sealings. Sealers 8, 9, 10, 11, 12 and 15 participated slightly more than the norm because they each produced more than two sealings and fewer than 21.5 sealings. Sealers 4, 5, 6 and 7 produced more than the expected number of sealings and participated to a greater degree than the norm because they produced more than 21.5 impressed sealings. Sealers 1, 2 and 3 produced significantly more than the norm number of impressed sealings and participated to a significantly greater degree. Sealers 13, 16, 17, 18, 19, 20, 21, 22, 23, 25, 28, 29, 30 and 31 produced fewer than the expected number, participated in impressing sealings to a lesser degree than the norm and participated to the same degree as each other because they made one or fewer impressed sealings. This analysis suggests these sealers participated in the activity of impressing sealings to different degrees, and the sample is large enough to support this conclusion.

4.3.3 Reading Glyptic

Research has established that the presence of seal glyptic does not necessarily indicate literacy⁷² (e.g. Pantalacci 1996; Bussmann 2013; Beuthe 2016). The type of glyptic and the context in which it was excavated can help determine whether the ancient Egyptians who used it could read it. The Formal glyptic excavated at Pottery Mound contains legible hieroglyphs in grammatically uniform arrangements. It also contains information relevant to institutional administration (e.g. titles, departments), and many of the titles clearly indicate the presence of royal and high-ranking scribes. Without the ability to read these seal impressions, they would have been impractical within the administration; therefore, it is likely the officials who used them could read them.

Sealers 1-12, 14, 17 and 18 all functioned as Scribes of Royal Documents; therefore, it is extremely likely they could read Formal glyptic. Sealers 13, 15, 16, 19-23 and 25 also held administrative titles, and this suggests they could also read hieroglyphic glyptic. This means as few as 15 and as many as 24 different sealers shared the practice of reading Formal seal glyptic at Pottery Mound.

⁷² This issue is part of a larger discussion on ‘administration without writing’ in both ancient Egypt and the Near East (e.g. Nissen et al, 1993; Bussmann 2013). A key facet of the debate centers on the development of writing and whether it replaced older forms of administrative tools and became the dominant form in institutional governance (Bussmann 2013). The widespread excavation of pictorial seal glyptic and sealings in institutional contexts suggests large-scale, non-written administrative systems were used both prior to and alongside writing in order to control resource movement and storage. In addition, an interesting question is whether seal glyptic and its widespread use contributed to literacy. The repetitive motion of stamping or impressing seals into sealings and other materials is physically (i.e. in terms of motor and cognitive skills) very similar to the repetitive motion of writing. The repetitive exercise of reading glyptic or interpreting and gaining information from glyptic is also very similar to reading the written word. These practices may have allowed ancient administrators to become familiar with these activities and the cognitive processes necessary to enact them and to develop literate abilities. This may be especially true because glyptic was so widespread.

The Informal glyptic does not contain legible hieroglyphs; therefore, it could not have been read in the traditional way. Its discovery on sealings with object impressions indicates it was used in an administrative context. It may have been used as a visual cue, or it may have contained complex information currently not decipherable. Either way, the presence of Informal glyptic on sealings suggests it could be understood (i.e. either read or identified by its uniqueness) by those who used it.

Sealers 28-31 owned seals with Informal glyptic and impressed sealings excavated in Layer VI; therefore, they likely had this ability. Which officials could read Informal glyptic is not clear; thus, interpreting Informal glyptic can only be suggested to have been shared by these six sealers at Pottery Mound.

The level of participation in reading and interpreting glyptic is impossible to determine. The number of times an individual read or practiced reading either Formal or Informal Glyptic cannot be derived from the evidence.

4.3.4 Making Sealings

The practice of making sealings is evidenced by the sealing-related objects excavated at Pottery Mound. It includes preparing the clay with water and temper and forming the clay with the sealers' hands (Nolan 2018: 276). Determining which sealers were responsible for preparing clay is difficult because the data excavated at Pottery Mound does not directly link an individual sealer with his or her sealing clay. Individual sealers might have been responsible for preparing and forming their own sealings, or one or several sealers might

have been responsible for making sealings for the other sealers. It is difficult to determine without impressions linking a particular sealer to a specific sealing.

4.4 Shared Repertoire

The shared repertoire is all things produced by the community of practice. It serves to reify the community of practice and to encourage and enable future participation as well as to demonstrate and reify its own existence (Wenger 1998: 82).

The repertoire in this study may be defined as anything sealing-related excavated in Layer VI at Pottery Mound. This consists of the sealings, seal impressions (both formal and informal), hieratic markings and sealing-related objects. The repertoire may also be defined as anything signified by the sealings and sealing-related objects. This includes participation-based dynamics, closing practices, impressing sealings, reading and interpreting Formal Glyptic, Informal Glyptic and Hieratic and making and discarding sealings.

From a communities of practice perspective, the sealings and sealing-related objects functioned as a shared repertoire among the sealers who used them. Their physical presence reified the sealing practice, reminding the sealers who engaged with these objects of the activities and interactions that structured and were structured by the practice. Less certain are whether the sealings and sealing-related objects encouraged the participation of new or peripheral members and whether they provided more experienced members with the artifacts to teach less experienced members how to properly seal. Core-periphery and master-novice dynamics structure practice in communities of practice theory, but their existence could not

be supported with the preserved data. Future studies may be able to delineate these relationships with additional types of information (e.g. scribes with educator titles).

4.5 Discussion

A communities of practice perspective on the sealing material highlights two important aspects of administrative practice at Pottery Mound: the dynamics structuring it and the education of its members in sealing activities. Both are explored in relation to what was already known about administration at Pottery Mound in the following sections.

4.5.1 New Dynamics at Pottery Mound

Nolan (2010) explores the institutional hierarchy embedded in the Pottery Mound titles, and he (2010: 360) argues that none existed for the scribes at Pottery Mound because the corpus lacks ranking titles (e.g. overseer, inspector, assistant), which were common among other branches of the central administration during the Old Kingdom. I build on the previous sealings analyses to conduct new analyses with the same statistical methods (i.e. median, Q1 and Q3 values) for the three titles best attested at Pottery Mound – Scribe of Royal Documents, Scribe of the King's Writing Case and Scribe of Royal Instructions – in order to examine Nolan's statement from a communities of practice perspective and discuss the dynamics underlying equality in institutional rank. This interpretation and discussion ignores the small sizes for some of the samples with the aim of illustrating how the information drawn from such analyses can be used with more robust sealing datasets in future research.

4.5.1.1 Scribes of Royal Documents

Scribe of Royal Documents is the best attested title in Layer VI at Pottery Mound. Thirteen different sealers bear this title: Sealers 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 20. Scribe of Royal Documents is also the only rank attested at Pottery Mound: there are no overseers (*imy.w-r*), inspectors (*shd.w*), assistants (*hry.w-ꜥ*) or other qualifying levels. The lack of institutional hierarchy suggests these 13 sealers, held the same job, performed the same tasks and likely participated in them to similar degrees.

However, my analyses suggest participation-level dynamics existed outside the hierarchy and may have affected the formal relationships created by it. Sealers 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 and 20, all Scribes, engaged in various sealing activities to different degrees. For example, statistical analysis indicates Sealers 1, 2 and 3 impressed sealings at higher levels than expected for the Scribes of Royal Documents who worked at Pottery Mound in the period corresponding with Layer VI. Sealers 4, 5 and 6 impressed sealings to slightly greater degrees than norm. Sealer 7 impressed sealings to the expected degree. Sealers 8 and 9 impressed sealings at slightly lower levels than expected, and Sealers 10, 11, 12 and 20 impressed sealings to lesser degrees than the norm. In a further example, Sealers 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 and 20 engaged in box sealing at different levels. Sealers 1, 2 and 4 sealed boxes to greater degrees than expected among the Scribes of Royal Documents. Sealers 3, 5 and 6 sealed boxes at slightly higher levels than anticipated. Sealer 10 sealed boxes at the norm level. Sealers 7, 8 and 11 sealed boxes to slightly lesser degrees than expected, and Sealers 9, 12 and 20 sealed boxes at lower levels than the norm. These examples illustrate the various participation levels, in sealing activities, among the Scribes of Royal Documents, even though these sealers bore the same institutional rank. This analysis

indicates the lived administrative experience of these scribes was complicated and based on more than the institutional hierarchy.

4.5.1.2 Scribes of the King's Writing Case

“Scribe of the King's Writing Case” is the second best attested title in Layer VI of the Pottery Mound corpus. Eight different sealers bear this title: Sealers, 2, 3, 4, 6, 7, 8, 10 and 12. It is also the only rank associated with this office: no senior or junior officials are attested at Pottery Mound. This lack of institutional hierarchy would suggest similarity in activity levels among these sealers; however, my analysis has shown they contributed to different degrees in various sealing activities. For example. Sealers 2 and 3 impressed sealings to greater degrees than expected for the Scribes of the King's Writing Case who were active in the period corresponding to Layer VI at Pottery Mound. Sealers 4 and 6 impressed sealings at slightly higher levels than anticipated. Sealers 7, 8 and 10 impressed sealings at slightly lower levels than the norm, and Sealers 12 and 20 impressed sealings to a lesser degree than expected. In addition, Sealers 2 and 4 sealed boxes at higher levels than expected. Sealers 3 and 6 sealed boxes to slightly greater degrees than anticipated. Sealers 7 and 10 sealed boxes at slightly lower levels than the norm, and Sealers 8 and 12 engaged in box sealing to lesser degrees than expected. These examples demonstrate that Scribes of the King's Writing Case participated in sealing activities to different degrees even though they bore the same institutional rank and title. They also suggest that relationships, based on participation in practice, existed and may have complicated relationships established by institutional rank. This analysis illustrates the potential existence of a dynamic lived, administrative existence for these scribes that has been obscured by a focus on rank and title.

4.5.1.3 Scribes for Royal Instructions/Keeper of Royal Instructions

Nolan (2010: 360) argues there was no institutional hierarchy among the Scribes for Royal Instruction. I would argue an institutional hierarchy probably existed because both titles “Keeper of Royal Instructions” and “Scribe for Royal Instruction” appear in the Pottery Mound corpus. Sealer 1 functioned as “Keeper” and Sealers 2, 6, 8 and 9 functioned as “Scribes,” suggesting Sealer 1 outranked the other sealers within the department of Royal Instructions at Pottery Mound. The rank for Sealer 13 is not preserved; therefore, he will not be included in this analysis.

Underlying this institutional hierarchy are relationships based on the level of participation of each sealer⁷³. Sealers 1, 2, 6, 8 and 9 contributed to various sealing tasks to different degrees (see section 4.5.1.1). For example, Sealer 2, a Scribe, impressed sealings at a slightly higher level than the norm, but Sealer 6, also a Scribe, impressed sealings to the expected degree, and Sealers 8 and 9, also Scribes, impressed sealings at lower levels. Although Sealer 1, the Keeper, impressed sealings at a higher level, the remaining sealers, all Scribes, engaged in impressing sealings to varying degrees. These results are intriguing because they suggest different participation levels in a given task (e.g. impressing sealings) than those that might be expected based only on rank in Old Kingdom institutional administration. In addition, Sealer 1 produced more box sealings and participated in box sealing at a higher level than the Scribes of Royal Instructions, which may be considered plausible because the former had the higher rank. Sealers 2, 6, 8 and 9 all made box sealings to different degrees: Sealer 2 contributed to a slightly greater degree, Sealer 6 participated at

⁷³ Other factors, such as social status and familial ties, may have impacted the sealing practice at Pottery Mound and the sealers’ participation in it; however, those factors and their direct effects on the sealing practice are not identifiable in the archaeological or textual record.

predictable levels, Sealers 8 contributed to a slightly lesser degree and Sealer 9 participated at a lower level. These results are more interesting because they suggest Scribes of Royal Instruction participated in a given sealing activity (e.g. box sealing) to different degrees even though they bear the same official rank and also that a sealer's level of engagement in box sealing did not impact his rank.

Conclusion

Some dynamics among sealers are easy to determine by analyzing and comparing their titles and ranks; however, institutionalized relationships are only part of the sealers' lived administrative experience. Relationships based on levels of participation as well as institutionalized norms structured the sealing practice at Pottery Mound.

4.5.2 Educating Administrators

The analyses of the sealings and seal impressions excavated in Layer VI at Pottery Mound do not support the identification of master-novice relationships among the identified sealers. I had hoped to extricate experience-related dynamics from the data through a statistical analysis of participation levels over time and use these to identify masters and novices among the sealers. Several issues with this approach arose and made it unviable to apply. The master-novice relationship plays a role in the development and transformation of practice in communities of practice theory, and it is something that can be investigated in future studies with, specifically, larger samples sizes of data.

Nevertheless, the sealers' titles and ranks, in conjunction with their relative levels of participation, may indicate some form of education occurred. Sealer 1 was the Keeper of Royal Instructions, and this has recently been used to suggest (Tallet and Lehner 2022) he was a master scribe who taught the other scribes in House Unit 1. Sealer 1 also owned a seal with Khafre's serekh name, and he impressed sealings to a significant degree and sealed boxes at a higher level than would be expected based on my statistical analysis of the data. This information would indicate Sealer 1 is the best candidate for the role of a master within the Pottery Mound and House Unit 1 community, but my analysis of participation levels creates doubt. The preserved and identifiable sealing evidence indicates Sealer 1 did not seal baskets, doors, papyri or peg-and-string devices, which creates the question of who taught the other sealers to make, attach and impress these types of sealings if indeed these other sealers were educated in House Unit 1? Sealer 1's sealings may not have all been preserved, and this may account for the lack of basket, door, papyrus and peg-and-string sealings with impressions of Sealer 1's seal, or Sealer 1 may not have participated in these activities to any degree and not been able to educate the other sealers in their enactment. Additional data would have gone a long way towards answering these questions, and future studies will, hopefully, be able to explore them in greater detail and with better success.

If the sealers did learn in House Unit 1, they learned in a local environment. Evidence from at least one ancient Egyptian source supports the possibility of local education. One of the few Old Kingdom references to scribal or administrative education is the Instructions of Ptahhotep⁷⁴. Ptahhotep worked as Vizier to the 5th Dynasty king Djedkare. His instructions have been found on Papyrus Prisse and other Middle Kingdom and New Kingdom papyri. A noteworthy passage reads:

⁷⁴ For a translation, see Simpson 2003: 129-148.

“Let your humble servant be commanded to appoint a successor so that I may tell him the words of those who heeded the counsels of the ancients, those who once listened to the gods...Then the majesty of this god said Teach him first about speaking, so that he will be an example to the children of the nobles...There is no one who has been born wise.”

This passage indicates an individual learned by working with an experienced professional in what might be loosely called an apprenticeship (Williams 1972: 215). The term apprenticeship has a specific definition, and it may be inappropriate to use it here without more information on the relationship between Ptahhotep and his successor. What this text does emphasize is the mater-novice relationship between the incumbent Vizier Ptahhotep and his potential successor as well as the responsibility of the incumbent to teach his successor the duties of Vizier. This passage in Ptahhotep's Instructions suggests part of an administrator's education occurred on a one-to-one basis in a local environment.

Chapter 5: Constellations of Sealing Practice at Giza

In this chapter, I present my analysis of the sealings excavated outside Pottery Mound at Giza. My work employs the constellations of practice approach (Introduction) in order to investigate sealing practice on a larger scale. This will help me explore the degree of continuity in sealing practice across a wider geographical area (section 5.2) and over an extended period of time (section 5.3). The results of my analysis will be integrated into broader discussions on change and stability in administration (section 5.4) and on decentralized and centralized education environments for administrators (section 5.5).

5.1 Constellations of Practice

Constellations of practice is part of the communities of practice methodology. It can be used to analyze more widespread connections and to explore continuity and discontinuity in practice. The large-scale nature of these connections makes using the original communities of practice approach impossible because the connections become less personal and more widespread: they are based on shared artifacts and shared activity rather than on frequent, socio-professional interactions (Wenger 1998: 127).

5.1.1 Shared Artifacts

Artifacts are the material things produced through practice (Wenger 1998: 49, 73, fig. 2.1). They function in conjunction with immaterial things as part of the shared repertoire, and they serve as tangible proof of practice (Wenger 1998: 73, fig. 2.1, 126). An artifact may be

defined as shared if it is found across the landscape of practice and not only in one area (Wenger 1998: 126).

This perspective on artifacts is useful when considering the nature of practice on a more expanded scale. Shared artifacts excavated within different contexts suggest continuity in practice across various arenas of meaning. Wenger (1998) focuses on different physical locations as one type of context, and he explores continuity in practice and how a practice can be shared by people working across a large geographical area. He (1998) also emphasizes different occupations as a second type of context, and he examines continuity in practice and how a practice can be shared by people working in different professions. I suggest different time periods can function as a third type of context. Artifacts of the same kinds can be found throughout history; therefore, they can be used to explore continuity in practice and the extent to which people shared a practice through time.

A lack of shared artifacts would suggest the opposite (i.e. discontinuity in practice). Knowing whether artifacts are shared makes determining the degree of continuity (and discontinuity) in practice across space, time and profession possible.

5.1.1.1 Boundary Objects

Boundary objects are a type of shared artifact. They move between or among practitioners located in different areas and professions as well as who are part of different practice hubs (Introduction). Boundary objects suggest continuity in practice because they indicate connections among those practitioners who handled them. These connections are physical because all parties physically engage with the object when they see it, touch it and

smell it. These connections are also mental because all practitioners know how the object was constructed and how it could be broken because they, themselves, made and broke sealings.

Sealings are logical boundary objects because they have the potential for mobility and to move among different people who sealed. Sealings were frequently used to secure goods in containers during transit. Wall reliefs from the tomb of Mereruka (Duell 1938: pl. 99) depict *hn*-chests being carried on poles to and from different locations. This indicates wooden boxes were secured with sealings and carried from an origin point to a destination or multiple destinations. Bags, baskets, jars and peg-and-string devices were likewise mobile, frequently secured with sealings and may have been used to transport goods (and the accompanying sealings⁷⁵) in similar ways. Papyrus, too, were frequently sealed and could be sent from one person to another person in different places.

The sealings' mobility suggests they were handled by different sealers. Sealers are defined as those people who engaged with sealings in creative, interpretive and possibly destructive ways. Sealers created and impressed sealings and secured them to various containers. Sealers also received containers with sealings, read the sealings and decided whether to retain the sealings and store the containers or to destroy the sealings and open the containers. Both sets of sealers worked in different places and maybe even in different occupations, but both sets handled the same sealing as it moved from one location to the other location.

⁷⁵ A study of sealing fabrics (i.e. clays and inclusions) with XRF or a similar technology and comparison with geological profiles of sites in the desert and along the Nile could yield useful information about where the sealings originated compared to where they were deposited and eventually excavated in the archaeological record.

Additionally, sealings were used to secure containers for long-term storage. Sealed storage jars and boxes have been found in any number of tombs⁷⁶ and indicate this activity occurred relatively frequently. It is likely bags, baskets and boxes were used in a similar way due to evidence from other periods in Egyptian history⁷⁷.

Long-term storage demonstrates sealings' temporal mobility: these objects moved through time and into the hands of different sealers. Both the sealers who created and impressed the sealings as well as the sealers who read and retained the sealings handled these objects and were involved in the sealings' temporal mobility as it moved from one point in time to a later point in time.

A sealing's ability to move across space and through time makes it a potential boundary object with the ability to indicate connections among different sealers and different hubs of sealing; however, it need not be a boundary object because a sealing might have been used by the same person or people locally or for a short period of time.

Determining whether a specific sealing was used locally or was transported can be difficult. An understanding of the sealing's function and context is necessary because this sheds light on how and where the sealing was used. A door sealing excavated outside a door, for example, suggests the sealing was used locally because it clearly secured a stationary object. A small jar sealing excavated on a small jar in a storeroom, however, suggests two possibilities: first, the object was closed with the sealing in or near the storeroom, or second,

⁷⁶ Examples of tombs where sealed jars and boxes were excavated include G2381A (Reisner 1942: 54 fig. 54, pl. 52g), G5370 (Junker 1944: 231-241, Abb. 96a, 96b, 97, Taf. xxxviii b, xxxix).

⁷⁷ An example of a tomb where a sealed bag was excavated is Magazine AA (Porter and Moss 1981: 441).

the object was closed with the sealing elsewhere and transported to the storeroom. Small jars were frequently used to transport various items in Egypt during the Old Kingdom (Nolan 2010: 106); therefore, the latter is a distinct possibility. The first case suggests local use, and only those practicing⁷⁸ within the vicinity would have engaged with the sealing. The second case suggests broader use, and both local and non-local practitioners likely came into contact with the sealing. Determining which possibility occurred and whether the sealing might usefully be identified as a boundary object in this example is not possible because not enough information was preserved or recovered.

A sealing's impression(s) may also help determine whether it was used locally or was transported. Sealings excavated in different locales but with the same glyptic imagery suggest the sealings had a common origin (i.e. the same seal). The seal owner might have moved from place to place impressing different sealings, but he or she might also have impressed sealings in one location and sent them out as part of secured, travelling goods. The latter is more likely because the concept of a sealer running around a large site, or around a larger territory, and trying to impress different sealings seems impractical, especially if the site is large, but identifying the type of sealings with the same impressions also sheds light on this issue. Door sealings excavated in different areas but with the same impression might suggest the former; however, small jar or bag sealings might suggest the latter.

An example of an exception would be multiple sealings with the same impressions excavated in dumps and the locations of their origins unknown⁷⁹. Their contexts make the

⁷⁸ In this case, I mean practicing sealing; however, those practicing other trades might very well have come into contact and engaged with the sealing on a minimal level.

⁷⁹ Pottery Mound is a good example of this type of exception, even though the evidence strongly suggests the originating location is in House Unit 1.

same original location a distinct possibility, in which case these sealings were used locally and could not be identified as boundary objects travelling between or among different sealers.

5.1.1.2 Brokers

A broker is a person who moves among and is known by practitioners working in different places and even during different generations (Introduction). They suggest the possibility of continuity in practice because they indicate connections among different practitioners and hubs of practice.

Evidence for brokers among sealings is limited. A broker must be identified through a unique seal impression and confirmed through the replication of that seal impression on sealings excavated in different places. The person responsible for that seal impression need not have travelled to those different places along with the sealings for the person to be considered a broker because his or her identity, defined in the seal impression, travelled with the sealings. The broker is identified through the unique seal impression on the different sealings.

5.1.2 Shared Activity

Activities are the physical actions and interactions practitioners enact while practicing their trades. They are the immaterial parts of the shared repertoire and the more dynamic evidence for practice (Introduction). Activities are defined as shared if multiple practitioners across the landscape of practice engage in them (Wenger 1998: 82, 125).

This perspective on activities is useful because it suggests continuity in practice. Evidence for shared activity excavated across an extended geographical area suggests a single practice had regional breadth. Evidence for shared activity excavated in multiple chronological contexts suggests a single practice had historical depth. A lack of shared activity within a practice would suggest discontinuity.

5.2 Sealing on the Giza Plateau

Constellations of practice can be used to analyze artifacts (i.e. shared repertoire) across a wide geographical area⁸⁰ (Introduction). The Giza plateau will be analyzed in this study because it is 2,325,000 meters squared (1500m x 1550m) and includes 12 groups of sealings and sealing-related objects in its area. Constellations of practice also makes use of the twin concepts of shared artifact and shared activity to interpret similarities in artifacts and activities as indicative of continuity in practice over an extended space (Introduction). This study uses these concepts to analyze the sealings and sealing-related objects excavated at Pottery Mound, House Unit 1, Area AA, Royal Administrative Building, Gallery Complex, Eastern Compound, East of Galleries, Eastern Town, Gebel el-Quibli, Khentkawes Town, Silo Building Complex and Menkaure Valley Temple and to discuss the spatial extent and degree of continuity in sealing practice across the Giza plateau.

⁸⁰ In the following sections, I explore how this occurs across the Giza plateau (in my opinion, this seemed the next, logical scale up from the site of Pottery Mound). Future analyses of sealings excavated at different sites in the Memphite region (e.g. Abusir, Saqqara) will give a broader perspective, and the next scale up, on how knowledge networks develop around sealing practice. Additional studies incorporating desert towns (e.g. Balat), southern cities (e.g. Elephantine) and peripheral outposts (e.g. Wadi el-Jarf) would broaden the scope even more and allow for a truly macro-scale perspective on sealing practice, especially beyond the capital at Memphis. Larger sealing corpora with identifiable impressions and sealers is necessary for these types of analyses, and other characteristics (e.g. material) may be taken into account.

5.2.1 Sealings as Shared Artifacts

The sealings excavated at Giza (Chapter 4) may be considered shared artifacts because they are the same type of object. Sealings were excavated in Pottery Mound, House Unit 1, Area AA, Royal Administrative Building, Gallery Complex, Eastern Compound, East of Galleries, Eastern Town, Gebel el-Quibli, Khentkawes Town, Silo Building Complex and Menkaure Valley Temple (see map 5.1). This shared artifact type suggests the administrators working in these areas shared part of the repertoire of the sealing practice. These sites are located at various distances from one another across the plateau, which suggests continuity in shared artifacts and sealing practice across Giza.

5.2.1.1 Sealings as Boundary Objects

Of the many thousands of sealings excavated at Giza, only a few can be positively conceived of as boundary objects. These sealings all bear impressions from Seal 1, and they were excavated in Pottery Mound, House Unit 1, Area AA and Gebel el-Quibli. Two of these locales are dumps, which means the sealing might have originated from anywhere on site. Many of those excavated at Pottery Mound likely originated in House Unit 1; however, those excavated at Gebel el-Quibli might have originated anywhere as well as at House Unit 1. The type of sealings impressed by Seal 1 are only recorded for Pottery Mound: bag, box, jar and possible container (Nolan 2010: 147). The lack of information on other sealing types makes determining the mobility of this particular seal difficult; nevertheless, the excavation of sealings with this impression in House Unit 1 and Area AA clearly suggest they circulated among different sealers and may be identified as boundary objects. Defined as boundary

objects, these sealings suggest a strong connection among the people and places across which and to which these sealings moved.

5.2.1.2 Sealings as Brokers

Among the sealings excavated at Giza, only 1 possible broker emerges: Sealer 1. This individual's unique seal impressed sealings excavated in Pottery Mound, House Unit 1, Area AA and Gebel el-Quibli. Pottery Mound and Gebel el-Quibli were dumps, but House Unit 1 and Area AA were areas of activity; thus, the sealers who worked in the latter areas would have recognized Sealer 1's unique impressions and been aware of his or her presence in their work. Sealer 1 is plausibly a broker, and he suggests continuity in practice across an extended space (i.e. Heit el-Ghurob).

5.2.2 Sealing-Related Objects as Shared Artifacts

Sealing-related objects are also worth considering as shared artifacts. Several groups of these objects were excavated in Royal Administrative Building, Gallery Complex, Eastern Town, Silo Building Complex and Pottery Mound (see map 5.2). Sealing-related objects carry identifying marks; however, logic dictates multiple people produced these groups of objects because the alternative is that one person moved around and made all of the sealing-related objects at each site. The excavation of sealing-related objects at multiple sites indicates continuity in sealing practice throughout the Heit el-Ghurob.

5.2.3 Closing Objects as Shared Activity

In addition to artifacts, sealing activities may be identified as shared among the sealers who worked at Giza. Closing objects is one such activity identified at Pottery Mound, and whether it was shared by sealers elsewhere at Giza will be explored in this section.

5.2.3.1 Closing Bags

Bag sealings were excavated in Royal Administrative Building and Gebel el-Quibli as well as in Pottery Mound (see map 5.3). Those excavated in RAB are not described in detail in the literature. The lack of description is problematic because it makes it impossible to determine how bags were closed with sealings and, more to the point, whether the bag closing sealing activity (or activities) at RAB was (or were) shared by sealers elsewhere at Giza⁸¹. Engel and Müller (2000: 38-39) and Pätznick (2005) identified several different types of bag sealings; therefore, the method employed to close bags with sealings cannot be assumed to be shared.

Fortunately, the bag sealings excavated at Gebel el-Quibli were described in detail in publication. They are flat and contain the imprint of the bag's material, cord and the occasional impression of a fold from the bag's material (Torcia 2007: 1818). This indicates the individuals who produced these bag sealings first tied the bag and then pressed the sealing against both the bag and cord to secure them.

⁸¹ See Chapter 3 and Chapter 4 for a discussion of the different types of bag sealings and why they indicate different bag sealing activities.

Based on Nolan's (88-92) and Torcia's (2007: 1818) descriptions of the bag sealings, those excavated at Pottery Mound and Gebel el-Quibli are very similar. From a constellations of practice perspective, this discovery would indicate the sealers who worked in these areas closed bags⁸² using the same method. This is important because it suggests continuity in this aspect of practice at these two sites but not necessarily across the entire site of Giza.

However, both Pottery Mound and Gebel el-Quibli are dumps. This means the sealings, and the activities they signify, originated elsewhere in Giza. Pottery Mound likely functioned as House Unit 1's dump (Chapter 2: sections 2.9.10 and 3.7.xi; Chapter 3: section 3.1), but where the material excavated in Gebel el-Quibli originated is unclear (Chapter 3: section 3.3). Several sealings with impressions of Seal 1 were excavated in Gebel el-Quibli as well as in House Unit 1 and Area AA, suggesting the sealings might have come from either of the latter locales and the possibility of shared activity in these areas. Many of the bag sealings also bore unique seal impressions. For example, one bag sealing contains both an impression with an official's titles and an incision with a personal name (Torcia 2007: 1819). The name is unknown among the Pottery Mound and House Unit 1 glyptic corpus. This suggests some of the bag sealings excavated in Gebel el-Quibli and Pottery Mound originated in different areas and supports the notion closing bags was a shared activity among sealers working in different parts of Giza.

⁸² As noted in Chapter 3 (p91), there existed several ways to close bags. Engel and Müller (2000) identified two different ways, and Ferioli and Fiandra (2007) identified several different ways.

5.2.3.2 Closing Baskets

Eleven basket sealings were excavated at Heit el-Ghurob: 1 at Pottery Mound and 10 at undisclosed locations. No description of them has been given. Ferioli and Fiandra (2007) and Blöbaum (2021) have identified multiple types of basket sealing; therefore, the activity of closing baskets with sealings cannot be assumed to be shared among sealers.

5.2.3.3 Closing Boxes

A significant number of box sealings were excavated at Pottery Mound, Area AA and Gebel el-Quibli (see map 5.4). A description of the Area AA box sealings has not been published. Engel and Müller (2000: 39-41) and Pätznick (2005: 42-47) identified several different types of box sealings; thus, the activity of closing boxes with sealings cannot be assumed to be shared by sealers.

Only a description of the Gebel el-Quibli sealings has been published. The Gebel el-Quibli box sealings are plano-convex with reverse impressions of crisscrossing cords (Torcia 2007: 1819). This suggests the people who produced them first tied the boxes and then laid the sealing over both the box and the cord.

The same activity was identified at Pottery Mound (Chapter 4: section 4.2.1.3). This suggests the sealers who dumped box sealings at Pottery Mound and Gebel el-Quibli used the same method to close boxes with sealings.

Additionally, the box sealings excavated at Gebel el-Quibli bore unique seal impressions. For example, several box sealings contain impressions with one or more of the titles *iry sbꜣt*, *iry wꜣt* and *ḥtm.w wyꜣwy nꜥr* (Torcia 2007: 1822). No sealings excavated at Pottery Mound or House Unit 1 bear impressions with these titles; therefore, it can be suggested the box sealings excavated at Gebel el-Quibli and at Pottery Mound originate in different locates. This indicates closing boxes with sealings was a shared activity, and it further indicates continuity in practice across Giza.

5.2.3.4 Closing Doors

Door sealings were excavated in Area AA, Royal Administrative Building and Gebel el-Quibli as well as in Pottery Mound (see map 5.5). Neither those excavated in Area AA nor the RAB have been fully published. Engel and Müller (2000: 43) and Pätznick (2005: 57-59) identify several different types of door sealings in their sealing typologies; therefore, closing doors with sealings cannot be assumed to be a shared activity among sealers in these different locations.

However, Torcia (2007: 1818) published descriptions of the door sealings excavated at Gebel el-Quibli. They bear impressions of either one or two pegs, one or several coils of rope and a door jamb (Torcia 2007: 1818). This suggests ancient sealers closed doors in one of two ways: either by looping a cord through a hole in the door and around a peg sticking out from the jamb and then securing the cord and peg against the door jamb with a sealing, or by winding a cord around two pegs, one attached to the jamb and one attached to the door, and securing both the cord and pegs against the flat surface of the door and angled surface of the jamb with a sealing.

Some door sealings excavated at Pottery Mound and Gebel el-Quibli are the same: they bear impressions of one peg, ropes and a door jamb. This suggests this activity was shared by sealers at Giza.

Additionally, unique impressions were identified on some of the door sealings excavated at Gebel el-Quibli. For example, several door sealings contain impressions with one or more of the titles *wꜣb ny.sw-t*, *mr* or *hꜣp is dfꜣ* or *smꜣ sꜣ ꜥ.w hwt wrt* (Torcia 2007: 1821). Glyptic with these titles was not found on sealings excavated at Pottery Mound or House Unit 1; thus, it is possible to suggest the sealings excavated at Gebel el-Quibli and at Pottery Mound originated in different places. This indicates the method of closing doors with sealings was shared, and it further suggests the continuity in practice across Giza.

5.2.3.5 Closing Jars

Jar sealings were excavated in Area AA, the Royal Administrative Building, Gebel el-Quibli, Khentkawes Town, Silo Building Complex and Pottery Mound (see map 5.6). Detailed descriptions of those excavated in Area AA, Royal Administrative Building and Khentkawes Town have not been published. Kaplony (1963: 51-55), Engel and Müller (2000: 35-38) and Pätznick (2005: 13-20, 34-37) identified several different types of jar sealings; thus, the method employed to close jars with sealings cannot be assumed to be the same.

Fortunately, the jar sealings excavated at Gebel el-Quibli and Silo Building Complex are described in publications. Gebel el-Quibli's large jar sealings are very large, shaped like cones or hemispheres, and bear reverse impressions of either wood or reed (Torcia 2007: 1818). This suggests large jars were covered or padded with natural materials and then closed

with large amounts of clay. The small jar sealings are comparatively smaller and contain impressions of textiles and ropes on their reverse sides (Torcia 2007: 1818). The jar sealings excavated at Silo Building Complex are also small, circular and bear rope and textile impressions (Nolan 2013: 12). The small jar sealings excavated at Gebel el-Quibli and Silo Building Complex are the same type, and they suggest smaller jars were first covered with cloth, the cloth tied with a cord, and then the entire package closed with a sealing.

The small jar sealings excavated at Gebel el-Quibli and Silo Building Complex are similar to the small jar sealings excavated at Pottery Mound. Unique seal impressions were discovered on the sealings excavated at Gebel el-Quibli. For example, one jar sealing contains an impression with *shd wꜣb.t bꜣty* and another the title *iry hdt dšrt* (Torcia 2007: 1820). No sealings with these titles were excavated at Pottery Mound or House Unit 1; therefore, the sealings excavated in these dumps plausibly originated in different locations. The same type of jar sealings excavated at Gebel el-Quibli, Silo Building Complex and Pottery Mound indicates closing small jars was a shared sealing activity, and it suggests continuity in practice across a broad landscape. The spatial breadth of this activity is emphasized by considering the roughly 500m that separates Pottery Mound from Silo Building Complex.

5.2.3.6 Closing Papyri

Papyrus sealings were excavated in Royal Administrative Building, Gebel el-Quibli, Khentkawes Town and Silo Building Complex as well as in Pottery Mound (see map 5.7). Those excavated in RAB and Khentkawes Town have not been fully published. The lack of details makes comparing them with other papyrus sealings and determining whether they

indicate shared activity impossible. Engel and Müller (2000: 43-44) and Pätznick (2005: 61) identified at least two different types of papyrus sealings: therefore, the methods used to close papyrus with sealings cannot be assumed to be shared.

The papyrus sealings excavated in Gebel el-Quibli and Silo Building Complex have been described and are comparable with those excavated in Pottery Mound. Gebel el-Quibli's sealings are small and smooth and bear impressions of string and papyri folds on their reverse sides (Torcia 2007: 1818). The Silo Building Complex's papyrus sealings are also small and round and bear impressions of papyrus and string on their reverse sides (Nolan 2013: 12, 14). These sealings suggest sealers folded a papyrus document, tied it with a string and then pressed the sealing across both fold and string to secure the document.

The same sealing type suggests closing papyri was a shared activity among sealers working near Pottery Mound and in Silo Building Complex and perhaps elsewhere on site. Unique seal impressions were found on the papyrus sealings excavated at Gebel el-Quibli. For example, a papyrus sealing bore impressions with the titles Khufu's name and the personal name Tjenti (Torcia 2007: 1820). No sealings with Khufu's name or Tjenti were excavated at Pottery Mound or House Unit 1; thus, it is plausible to suggest the sealings excavated in these dumps originated in different locations. It is also possible to suggest closing papyrus with sealings was a shared activity among sealers. The distance among Pottery Mound, Gebel el-Quibli and Silo Building Complex further indicates continuity in this particular aspect of sealing practice across an extended space (i.e. Giza).

5.2.3.7 Closing Peg-and-String Devices

Peg-and-string sealings were excavated in Area AA and Silo Building Complex as well as in Pottery Mound. Those excavated in Area AA and Silo Building Complex have not been fully published. Ferioli and Fiandra (2007) identified several types of peg-and-string sealings; thus, the method for closing peg-and-string devices cannot be assumed to be shared among the sealers at Giza.

5.2.4 Impressing Sealings as Shared Activity

Sealings impressed with cylinder seals were excavated in House Unit 1, Area AA, Royal Administrative Building, Gallery Complex, East of Galleries, Eastern Compound, Eastern Town, Gebel el-Quibli, Silo Building Complex, Khentkawes Town, Menkaure Valley Temple and Pottery Mound (see map 5.8). Their discovery in multiple locales suggests this activity was shared among certain sealers working at Giza.

House Unit 1, Area AA, Royal Administrative Building, Gallery Complex, East of Galleries, Eastern Compound, Eastern Town and Pottery Mound are all part of the Heit el-Ghurob (see map 5.1). Heit el-Ghurob lies roughly 450m east and 150m south of Menkaure Valley Temple, which lies between 100-150m south of Khentkawes Town and Silo Building Complex. Gebel el-Quibli lies 150m east and 200m south of the Menkaure Valley Temple and 220m east of Heit el-Ghurob. The varying locations in which impressed sealings were excavated and the distances among them further suggests continuity in this particular activity of sealing practice over a wider area.

5.2.5 Reading Glyptic as Shared Activity

Reading Formal Glyptic and reading Informal Glyptic were two activities shared among the sealers who deposited sealings at Pottery Mound (Chapter 4: section 4.2.3). This section explores whether these two activities were shared among sealers who worked outside Pottery Mound and elsewhere at Giza.

5.2.5.1 Reading Formal Glyptic

Seal impressions with Formal Glyptic were found on sealings excavated in House Unit 1, Area AA, Royal Administrative Building, Gallery Complex, East of Galleries, Eastern Compound, Gebel el-Quibli, Khentkawes Town, Silo Building Complex, and Menkaure Valley Temple as well as in Pottery Mound (see map 5.9). The multitude of sealings bearing impressions with Formal Glyptic suggests a number of sealers could and did read or otherwise know how to interpret Formal Glyptic as they practiced sealing. Their excavation at various sites further indicates this practice was shared throughout Giza.

House Unit 1, Area AA, Royal Administrative Building, Gallery Complex, East of Galleries, and Eastern Compound are located within the Heit el-Ghurob. The significant distances among Heit el-Ghurob, Gebel el-Quibli, Khentkawes Town, Silo Building Complex and Menkaure Valley Temple suggest reading Formal Glyptic was an activity shared across a relatively large area at Giza.

5.2.5.2 Reading Informal Glyptic

Sealings containing impressions with Informal Glyptic were excavated at Area AA, Royal Administrative Building, East of Galleries, Gebel el-Quibli, and Silo Building Complex as well as in Pottery Mound (see map 5.10). This would indicate reading or otherwise deciphering Informal Glyptic was an activity shared across the administrative landscape of Giza.

Pottery Mound, Area AA, Royal Administrative Building and East of Galleries are all part of Heit el-Ghurob (see map 5.1). The distance among Heir el-Ghurob, Gebel el-Quibli and Khentkawes Town and Silo Building Complex is substantial and indicates the activity was shared over a wider area.

5.2.6 Making Sealings as Shared Activity

Sealing-related objects are evidence for the activity of making sealings (Chapter 3). They were excavated at Royal Administrative Building, Eastern Town, Gallery Complex and Pottery Mound (see map 5.11). This indicates making sealings was an activity shared by the sealers who worked in Heit el-Ghurob, and it suggests continuity in practice across an extended geographic area.

Conclusion

The degree of continuity in sealing practice on the Giza plateau can be measured by the number of sites at which shared artifacts were excavated and at which shared activity

occurred. The highest number is 12 sites, the lowest number is 2 and the middle number is 7 sites. A high degree of continuity exists if the artifacts or activities occurred at 10 or more sites. A moderate degree exists if artifacts or activities occurred at between 5-9 sites, and a low degree exists if artifacts or activities occurred at fewer than 5 sites.

The study indicates a high degree of continuity in practice for sealings as well as for impressing sealings and reading Formal glyptic: sealings, impressed sealings and sealings with Formal glyptic were excavated at all 12 sites. It also revealed a low degree of continuity in closing bags, boxes, doors, jars and papyrus because bag sealings, box sealings, door sealings, jar sealings and papyrus sealings were only excavated at fewer than 5 sites. The study also suggested a moderate degree of continuity in sealing practice for sealing-related objects, making sealings, and reading Informal glyptic because these artifacts and activities occurred at between 5-6 sites. These results indicate a moderate to high degree of continuity in sealing practice overall on the Giza plateau.

5.3 Sealing in the Old Kingdom

Constellations of practice can be used to explore continuity in practice over an extended period of time (Introduction). This is possible because artifacts and activities can be shared among practitioners who lived and worked in different periods. Artifacts, in particular, can be shared as both a type of object and as an heirloom⁸³, the latter of which can also be identified as a boundary object.

⁸³ Cylinder seals with kings' *serekhs* and used in an administrative context were not used as heirloom objects (Chapter 1: section 1.3, 1.4.a).

The time period examined in this case study is the Old Kingdom. It lasted 432 years, and all twelve sets of sealings and sealing-related objects were excavated in contexts dated to this period. My study uses the concepts of shared artifact and shared activity to interpret these objects and to discuss the degree of continuity in sealing practice in the Old Kingdom.

5.3.1 Sealings

Evidence indicates the sealings excavated at Giza were used during different pharaohs' reigns. Many sealings excavated at Gebel el-Quibli bear Khufu's and Khafre's Horus names. The sealings excavated at Pottery Mound, House Unit 1, Area AA, Gallery Complex, East of Galleries contain impressions with Khafre's or Menkaure's Horus names. Those excavated in the Royal Administrative Building and Eastern Town bear impressions with Khafre's, Menkaure's and Userkaf's Horus names. Those excavated in the Khentkawes Town and Silo Building Complex were used in the mid-4th to late 5th Dynasty (Chapter 3: sections 3.4 and 3.5). The sealings excavated in the Menkaure Valley Temple belong to the mid-4th to mid-6th Dynasty (Chapter 3: section 3.6)⁸⁴.

The sealing evidence suggests sealings were artifacts shared by the sealers who worked at Giza from the early 4th Dynasty (Khufu's reign) to the mid-6th Dynasty (Pepi's reign). The rulers Djedefra, Shepsekare, Menkauhor, Unas and Userkare are not identified in the glyptic record. Djedefra ruled after Khufu and was buried at Abu Rawash. There would be little reason for his name to appear on sealings in Giza unless the sealings played a role in the maintenance of Khufu's funerary cult. Shepsekare, Unas and Userkare are poorly attested

⁸⁴ Whether the Silo Building Complex, Khentkawes Town and Menkaure Valley Town were occupied consistently throughout these periods remains a question because evidence for specific kings of the late 4th and 5th Dynasties is lacking.

in the archaeological and historical record and are assumed to have reigned for short periods of time (Chapter 1). Menkauhor is better attested but not on the Giza plateau. He is only identified twice in inscriptions in the tombs of Hemu and Niankhmin (El-Washahy and Hany 2020: 8-9, 11). Menkauhor is also attested on a seal excavated in the Sinai Peninsula but his name has never been found on sealings excavated in Egypt or Egyptian territories (El-Washahy and Hany 2020: 13). The fact they are missing from sealings' inscriptions has no significant bearing on either the duration during which sealings were shared artifacts, and the sealings still demonstrate continuity in practice over an extended period of time of roughly 300 years (calculated from the beginning of Khufu's reign to the end of Pepi I's reign) on the Giza plateau.

5.3.2 Sealing-Related Objects

The evidence suggests sealing-related objects can be dated to different kings' reigns. Those excavated at Pottery Mound and Gallery Complex were found in the same stratigraphic layers as sealings with Khafre's and Menkaure's Horus names; thus, the sealing-related objects can be assigned to these reigns. The sealing-related objects excavated in Royal Administrative Building, Eastern Town and Silo Building Complex were excavated in the same stratigraphic layers as sealings with Khafre's, Menkaure's, Userkaf's, Sahure's, Raneferef's and Niuserre's Horus names; therefore, the sealing-related objects can be assigned to these reigns. This evidence together indicates sealing-related objects were shared by the sealers who worked in the mid-4th to late 5th Dynasties at Giza.

5.3.3 Closing Objects

Closing objects was one sealing activity shared by sealers at Pottery Mound during Khafre's and Menkaure's reigns. This section examines the evidence for whether it was also shared by sealers at Giza during the Old Kingdom.

5.3.3.1 Closing Bags

Sealers shared the activity of closing bags with sealings at Pottery Mound and Gebel el-Quibli (section 5.2.2.1). These sites functioned during slightly different periods. Bag sealings with Khafre's and Menkaure's Horus names were excavated in Pottery Mound, and bag sealings with Khufu's and Khafre's names were excavated in Gebel el-Quibli (Torcia 2007: 1819, 1820). This indicates closing bags was an activity shared from the early to mid-4th Dynasty at Giza.

5.3.3.2 Closing Boxes

Closing boxes was a shared activity among the sealers who deposited sealings at Pottery Mound and Gebel el-Quibli (section 5.2.2.3). Box sealings excavated at Gebel el-Quibli contain both Khufu's and Khafre's names (Torcia 2007: 1819, 1820), and box sealings excavated at Pottery Mound contain both Khafre's and Menkaure's Horus names (Nolan 2010). This indicates closing boxes was shared by sealers working in the early to mid-4th Dynasty.

5.3.3.3 Closing Doors

Sealers shared the activity of closing doors at Pottery Mound and Gebel el-Quibli (section 5.2.2.4). The door sealings excavated at Pottery Mound and Gebel el-Quibli contain Khafre's Horus name. One sealing with Khufu's Horus name contains the phrase "House of the Doors of Khufu" (Torcia 2007: 1819), but the sealing type is not identified. This indicates closing doors with sealings was shared at these sites during Khafre's reign in the mid-4th Dynasty.

5.3.3.4 Closing Small Jars

Closing small jars was a shared activity among the sealers who deposited sealings into Pottery Mound and Gebel el-Quibli as well as worked at Silo Building Complex (section 5.2.2.5). The jar sealings excavated at Pottery Mound contain impressions with Khafre's or Menkaure's Horus names. The jar sealings excavated at Gebel el-Quibli bear impressions with Khufu's or Khafre's Horus name. The Horus name(s) on the jar sealings excavated at Silo Building Complex have not been published, and many sealings excavated in Silo Building Complex contain the Horus names of Menkaure, Userkaf, Sahure, Rneferet and Niuserre. This indicates closing jars with sealings was a shared activity in Khufu's, Khafre's and Menkaure's reigns in the early to mid-4th Dynasty.

5.3.3.5 Closing Papyrus

Sealers who deposited sealings in Pottery Mound and Gebel el-Quibli and who worked at Silo Building Complex shared the activity of closing papyri with sealings (section

5.2.2.4). Glyptic evidence indicates the papyrus sealings excavated in Gebel el-Quibli functioned during both Khufu's and Khafre's reigns (Torcia 2007: 1820), and those excavated at Pottery Mound functioned during Khafre's and Menkaure's reigns (Nolan 2010). The Horus names found on the papyrus sealings excavated in Silo Building Complex have not been published. The remaining data indicates the activity of closing a papyrus with a sealing was shared by the sealers who worked in the early to mid-4th Dynasty at Giza.

5.3.4 Impressing Sealings

Impressing sealings was a shared activity among the sealers who deposited sealings at Pottery Mound and Gebel el-Quibli and worked at House Unit 1, Area AA, Royal Administrative Building, Gallery Complex, East of Galleries, Eastern Compound, Eastern Town, Silo Building Complex, Khentkawes Town, and Menkaure Valley Temple (section 5.2.3). Some of the impressed sealings excavated at Gebel el-Quibli bear the Horus names of Khufu and Khafre. Many impressed sealings excavated at Pottery Mound, House Unit 1, Area AA, Royal Administrative Building, East of Galleries, Eastern Compound, Khentkawes Town, Silo Building Complex, and Menkaure Valley Temple contain Khafre's, Menkaure's and Shepsekaf's Horus names. Some of the impressed sealings excavated at Royal Administrative Building, Silo Building Complex, Khentkawes Town and Menkaure Valley Temple bear Userkaf's, Sahure's, Neferirkare's, Raneferef's, and Niuserre's Horus names. The many rulers' reigns in which this activity occurred suggests it was shared over a lengthy period of time from the early 4th to mid-5th Dynasties.

5.3.5 Reading Glyptic

Reading Formal Glyptic and reading Informal Glyptic were two activities shared among the sealers whose sealings were discarded in Pottery Mound in the mid-4th Dynasty (Chapter 4: section 4.2.3). This section explores whether these two activities were also shared among the sealers who worked at Giza during the Old Kingdom.

5.3.5.1 Reading Formal Glyptic

Sealers whose sealings were deposited at Pottery Mound and Gebel el-Quibli and who worked at House Unit 1, Area AA, Royal Administrative Building, Gallery Complex, East of Galleries, Eastern Town, Khentkawes Town, Silo Building Complex and Menkaure Valley Temple shared the activity of reading formal glyptic (section 5.2.4.1). Several sealings excavated at Gebel el-Quibli bear both Khufu's and Khafre's Horus names. Many sealings excavated in Pottery Mound, House Unit 1, Area AA, Royal Administrative Building, East of Galleries, Eastern Compound, Khentkawes Town, Silo Building Complex and Menkaure's Valley Temple contain Khafre's, Menkaure's and Shepsekaf's Horus names. Some sealings excavated in Khentkawes Town, Silo Building Complex and Menkaure Valley Temple bear Userkaf's, Sahure's, Neferirkare's, Raneferef's and Niuserre's Horus names. This evidence suggests reading Formal Glyptic was an activity shared over an extended period of time from the early 4th to late 5th Dynasties.

5.3.5.2 Reading Informal Glyptic

Reading Informal Glyptic was a shared activity among sealers whose sealings were dumped into Pottery Mound and Gebel el-Quibli and those who worked in Area AA, Royal Administrative Building, East of Galleries and Silo Building Complex (section 5.2.4.2). Several sealings with Informal Glyptic were excavated alongside sealings with Khufu's and Khafre's Horus names at Gebel el-Quibli. Sealings with Informal Glyptic were also excavated in the same stratigraphic layers as sealings with Khafre's, Menkaure's and Userkaf's Horus names at Pottery Mound, Area AA, Royal Administrative Building and East of Galleries. This indicates reading Informal Glyptic was a shared activity from the early 4th to early 5th Dynasty at Giza.

5.3.6 Making Sealings

Sealers shared the activity of making sealings near Pottery Mound and at Royal Administrative Building, Gallery Complex and Eastern Town (section 5.2.5). Sealing-related objects were excavated alongside sealings with Khafre's, Menkaure's and Userkaf's at Royal Administrative Building, Gallery Complex and Eastern Town. This indicates making sealings was shared over an extended period of time from the mid-4th to early 5th Dynasties.

The degree of continuity in sealing practice in the Old Kingdom can be determined by the number of kings' reigns during which an artifact or activity was shared. The range is between 11 reigns and two reigns and the median is six or seven reigns. A high degree of continuity in sealing practice is signaled by the occurrence of shared sealings artifacts and activities in more than eight pharaohs' reigns. An average degree of continuity is signaled by

the occurrence of artifacts or activities in between five and eight reigns, and a low degree of continuity is signaled by the occurrence of artifacts or activities in fewer than five reigns.

Sealings, impressing sealings and reading Formal glyptic occurred in all 11 identified kings' reigns, and this suggests a high degree of continuity over time in these aspects of sealing practice. Sealing-related objects and making sealings occurred in seven reigns and suggest a moderate degree of continuity in these aspects of sealing practice. Closing bags, boxes, jars and papyri and reading Informal glyptic occurred during four reigns and indicate a low degree of continuity in these aspects of sealing practice. My study suggests an overall moderate degree of continuity in sealing practice during the Old Kingdom.

Conclusion

Artifacts and activities were shared among sealers who worked at a variety of sites across Giza and during different kings' reigns and dynasties in the Old Kingdom. Sealings were excavated across the Giza plateau and suggest shared artifacts among sealers in the Old Kingdom. Sealing-related objects were excavated in Pottery Mound, Royal Administrative building, Eastern Town and Gallery Complex and also indicate shared artifacts among sealers in the 4th and 5th Dynasties. Closing bags, boxes and doors with sealings were shared activities by sealers who discarded sealings at Pottery Mound and Gebel el-Quibli in the early to mid-4th Dynasty. Closing small jars and papyri were shared activities by sealers who discarded sealings into Pottery Mound and Gebel el-Quibli and who worked at Silo Building Complex during the 4th Dynasty and perhaps later. Sealers who deposited sealings in Pottery Mound and Gebel el-Quibli as well as those who worked at House Unit 1, Area AA, Royal Administrative Building, Gallery Complex, East of Galleries, Eastern Compound, Eastern

Town, Khentkawes Town and Menkaure Valley Temple shared the activity of impressing sealings from the early 4th to mid-5th Dynasties. Reading formal glyptic was the shared activity of sealers working in the same places from the early 4th to the late 5th Dynasties. Reading informal glyptic was shared by sealers who discarded sealings at Pottery Mound and Gebel el-Quibli and who worked at Area AA, Royal Administrative Building, East of Galleries and Silo Building Complex from the early 4th to early 5th Dynasties. And sealers who deposited sealings in Pottery Mound and worked at Royal Administrative Building, Gallery Complex and Eastern Town made sealings from the mid-4th to early 5th Dynasty.

The shared artifacts and activities excavated on the Giza plateau from the 4th to 6th Dynasties suggest continuity in sealing practice over an extended period of time. The following section explores whether this continuity is maintained across the various administrative positions evident from seal impressions.

5.4 Shared Artifacts and Activities in the Central Administration

A significant number of administrative offices and institutions are documented in the glyptic found on the sealings excavated at Giza. These include Sub-Director of the Royal Funerary Workshop, Assistant Sub-Director of the Royal Funerary Workshop, Inspector of the Assistants of the Royal Funerary Workshop, *wꜥb* Priest, *ḥm-nṯr* Hathor, Controller of Prophets, Seal(er) of the Storehouse, Sealer of the Magazine, Elder of the Estate, Porter at the Will of the King of Upper and Lower Egypt, and Overseer of the Pyramid ‘Great is Khafre,’ Scribe of Royal Documents, Scribe of Royal Documents for Royal Instructions, Keeper of Royal Instructions, Scribe of Royal Documents and the King’s Writing Case, Scribe of the

King's Writing Case, Scribe of Royal Documents for Royal Works, Scribe of Royal Documents for All Royal Works and Judge and Scribe of *ḥꜥḥ*.

Each occupation required a different set of artifacts and activities to be effectively performed. For example, the Prophet of Hathor performed rituals, prepared offerings and maintained the sacred image of the goddess as part of his daily duties in the cult of Hathor (Schaefer 1981: 10). The Prophet also managed other prophets, priests and temple personnel and kept records of the cult's agricultural estates and other sources of income (Schaefer 1981: 11). These various duties suggest the Prophet of Hathor engaged in a multitude of activities and used a different set of tools and skills to accomplish each task.

In another example, the Judge and Scribe of *ḥꜥḥ* listened to court cases, spoke with defendants and handed down judgements in courts and in private (Chapter 4: section 4.2.1.3). This official also recorded information about court cases and corresponded through papyrus documents. These duties suggest the Judge and Scribe of *ḥꜥḥ* engaged in multiple activities with various sets of artifacts in order to effectively perform the job.

Despite the differences in duties and the sets of tools and skills needed to perform each office, all positions shared the activity of sealing and the artifact of a sealing. This fact is demonstrated by the seal impressions with these titles on the sealings excavated at Giza and other evidence. The Prophet of Hathor closed sanctuary doors with a sealing after the day's last ritual and broke the sealing open before the following day's first ritual (Doxey 2001). The Judge and Scribe of *ḥꜥḥ* sent papyrus documents with impressed sealings (Chapter 5: section 5.1.1.3). Sealing and sealings were important parts of these and the other offices

identified in the glyptic, and their ubiquity among different offices suggests sealers with different official positions shared sealing practice.

Shared sealing practice is important because it demonstrates a practice-based connection among administrators in the central government. Administrators are typically defined by their ranking (e.g. Baer 1960; Strudwick 1985; Moreno-Garcia 2013a) or geographical (e.g. Piacentini 2002; Papazian 2013; Martinet 2019) relationships in the scholarship on this subject. These studies tend to highlight the differences among officials and the different components of the central administration. I argue officials can also be defined by what unites them, and sealing practice is what unites them in this case. It was shared by administrators in different offices and ranks as well as in different places (section 5.2) and times (section 5.3). A shared sealing practice suggests the central government was less differentiated and more connected than has been previously argued.

It also reaffirms the complexity of the central government of the Old Kingdom. Public administration grew to include a number of new offices and departments and to incorporate people from across Egypt in the 4th, 5th and 6th Dynasties (Bussmann 2015). This suggests change, innovation and the mutation of a relatively simple system based on hereditary privilege into an unwieldy network based on royal need and elite patronage.

Yet, the evidence from Giza suggests not everything changed. Sealing practice, and the activities and artifacts that define it, remained roughly the same over the course of the Old Kingdom. The widespread nature and longevity of this practice provided stability and support to a changing administration and administrative system.

5.5 Educating Administrators

Continuity in sealing practice exists among the sealers who sealed at Giza during the Old Kingdom; however, the variety of locations, periods and professions in which they were used all indicate the sealers who used them did not interact regularly and were not part of the same, local sealing practice. This situation suggests learning to seal and to be an administrator, or certain aspects of these jobs, were centralized.

Several passages from Old Kingdom biographical texts support this claim. A biographical text typically describes an individual's career, service to the king and best qualities from an idealized perspective⁸⁵, and they are often included in an individual's tomb on either the tomb wall or false door. At least two biographical texts from the Old Kingdom suggest centralized learning activities: the biography of Ptahshepses⁸⁶ and the biography of Meryrenefer Qar⁸⁷. Ptahshepses was an administrator in the central government and son-in-law to Userkaf. His biography was discovered on the limestone false-door in his tomb at Saqqara, and it is dated to the 5th Dynasty on the basis of the rulers named in his texts (Strudwick 2005: 303-304). The panel contains eight columns of texts that describe his titles, works under four different kings and marriage to a princess. Two passages read:

“A child who was born...during the time of Menkaure, who was educated among the royal children in the palace of the king and in the privacy of the royal harem, one more esteemed than any other child, Ptahshepses.

⁸⁵ Biographical texts are considered idealized texts meant to preserve the best characteristics and achievements of the individual for the afterlife (Stauder-Porchet, Froot and Stauder 2020). This does not mean they cannot be trusted; rather they need to be understood as incomplete and highlighting the only part (usually the best part) of an individual's career and life.

⁸⁶ For a translation, see Dorman 2002.

⁸⁷ For a translation, see El-Khadragy 2002.

A youth who tied on the girdle...during the time of Shepsekaf, who was educated among the royal children in the palace of the king and in the privacy of the royal harem, one more esteemed than any other youth, Ptahshepses” (Dorman 2002: 101-102).

These passages indicate some children were chosen to work for the central administration or royal family and were educated in these jobs in the palace. This might suggest that some learning processes were centralized and it might even be possible to consider the learning environment to have been structured more like a modern school with a teacher and pupils. The biography of Meryrenefer Qar supports a similar conclusion. His biography was discovered on the false door and architrave in his tomb at Edfu, and it is dated to the mid-6th Dynasty because the 6th Dynasty rulers Teti and Pepi are mentioned in it (Strudwick 2005: 342-343).

“...I was a youth who tied the headband in the time of Teti, and then I was taken to Pepi to be given an education among the children of the chiefs. I was promoted to sole companion and overseer of the Palace Attendants in the time of Pepi” (El-Khadragy 2002: 211).

Both biographies indicate males of varying ages (child - *hrd*, youth - *idw*) traveled to the palace to learn to be scribes and administrators for the central administration. This suggests these people were educated in a centralized location where they participated in learning activities together and shared the learning experience. Ptahshepses’ biography further suggests they were brought in as “children” (*hrd*) and educated until they were “youths” (*idw*). This suggests they were educated together for an extended period of time.

Additionally, the Old Kingdom Instruction Texts support the notion of a centralized learning system and literary tradition. The presentation of Instruction Texts is the same: the equivalent format, words, grammar and style were used. This suggests a centralized

education for the scribes and administrators who wrote these texts and may also speak to a literary tradition from the Early Dynastic period now lost to modern scholars.

Instruction Texts are usually written from a father or master to a son or apprentice(s), and they relate virtues necessary for leading a successful and satisfying life. Only three examples, ostensibly from the Old Kingdom⁸⁸, exist: the Instruction of Prince Hordjedef, the Instruction Addressed to Kagemni and the Instruction of Ptahhotep (Lichtheim 1975: 36-37, 58-82). Prince Hordjedef's text was discovered on nine New Kingdom ostraca and a Late Period wooden tablet (Lichtheim 1975: 58). Only the beginning of the original text has been preserved on these artifacts, and it describes the importance of finding and raising a good family as well as building and maintaining a funerary establishment. The Instruction Addressed to Kagemni was found on the first two pages of the Papyrus Prisse⁸⁹ (Lichtheim 1975: 59; Simpson 2003: 149). This document was excavated in Thebes, and it has been dated to the 12th Dynasty (Lichtheim 1975: 59). The Instruction Addressed to Kagemni describe how to be a good and successful person in life through restraint in speaking, acting, and eating and drinking. The Instruction of Ptahhotep was also discovered on the Papyrus Prisse after several blank pages following the Instruction Addressed to Kagemni (Lichtheim 1975: 59). The text was also found on at least two other papyrus rolls from the Middle Kingdom and New Kingdom and one wooden tablet from the Late Period (Lichtheim 1979: 61; Simpson 2003: 130). These artifacts contain alternative and less complete versions of the text; therefore, most scholars use the version copied in Papyrus Prisse. The Instructions of

⁸⁸ Lichtheim (1975: 58-62) explores the question of when the originals of each Instruction Text were written. She argues the originals of these three texts were written some time during the Old Kingdom but differ on the reigns and dynasties. I mention this issue because the only extant copies of these Old Kingdom texts were found on papyrus and ostraca from the Middle Kingdom and New Kingdom.

⁸⁹ P. Prisse is currently held in the Bibliothèque Nationale in Paris.

Ptahhotep contain 37 admonitions, a prologue and an epilogue describing how to behave in order to be successful financially, politically and personally.

The Instruction Texts retain a similar format. The introductions to Hordjedef's and Ptahhotep's Instructions are presented using the same grammatical style and wording, and they are, roughly, the same length:

Hordjedef's Instruction Text: Introduction (after Simpson 2003: 127): *The beginning of the instruction which the hereditary prince and count, the king's son Hordjedef made for his son whom he raised up, named Aubire. He says...*

Ptahhotep's Instruction Text: Introduction (after Simpson 2003: 130): *The beginning of the instruction, written by the hereditary noble, the prince, the father of the god, the beloved god, the judge of the six law courts, the arbiter who causes contentment throughout the entire land, the mayor of the city, the vizier Ptahhotep, under the majesty of the King of Upper and Lower Egypt, Isesi who lives forever and eternity. The mayor of the city, the vizier Ptahhotep says...*

Additionally, all three Instruction Texts use an ambiguous form of god: no specific god is ever mentioned. This is relatively rare in ancient Egypt and suggests a further form of uniformity in these Old Kingdom Instruction Texts.

Two Instruction Texts were also copied multiple times in later periods. Hordjedef's Instructions were found on 10 different artifacts and Ptahhotep's Instructions were found on four different artifacts, suggesting these texts were copied and circulated. While later copying of these texts is not indicative of centralized learning, the practice is suggestive of it because they were produced in the same style and grammatical tradition. Williams (1972: 215) further suggests the Old Kingdom Instruction Texts were produced by experienced scribes for their sons and students for educating them in both scribal and life lessons. The similarities in

format and multiple examples of each text support the notion of a centralized learning system.

Based on the results determined in Chapters 4 and 5, sealers and officers of the central administration learned sealing practice and administration in two different contexts. From a communities of practice perspective, the sealings excavated at Pottery Mound belonged to sealers who worked in a local community and learned to seal through practice. They labored alongside other sealers who were both experienced and inexperienced, and they learned from both their own participation and their interactions with the other sealers around them. From a constellations of practice perspective, the uniformity in some of the sealings excavated at different sites across the Giza plateau suggest some sealers learned to seal in a centralized environment. They were educated in the palace and learned the same methods of closing objects, reading glyptic and making sealings from a single source. The possibility of two different systems – one local, one centralized – of education exists, but its existence is not certain.

The results from these chapters indicate learning occurred in both decentralized and centralized environments. It is to be expected because there are multiple ways of learning, and it supports what Williams (1972) has suggested: administrators were educated in both local and centralized environments.

Conclusion

Communities of practice theory offers considerable potential to explore administrative practice and socio-professional relationships through the archaeological and textual record of ancient societies. The case study undertaken here, however, demonstrates that a range of criteria needs to be in place before the full usefulness of the theory can be exploited. Foremost, the dataset needs to be of sufficient scale and quality; the volume of material utilized here ultimately proved too small to be of any effective use with the approach and methods employed. In addition, it proved difficult to reconcile Pottery Mound's archaeological stratigraphy with the ancient sealers' lived experience of sealing practice, which also made the results untenable when discussing sealers' relationships. This inability to quantify key, interpersonal connections with the archaeological remains made exploring the sealers' various social relationships highly theoretical and thus problematic. Nevertheless, the exercise has identified not only some of the necessary criteria for using communities of practice but also suggests that the theory can be a useful tool for exploring questions around professional relationships in past societies. These issues are explored in greater detail in **sections 6.1 and 6.2**, respectively, and potential solutions and additional thoughts are discussed in **sections 6.3 and 6.4**.

6.1 Issues with the data and method produced untenable results

First, the sample sizes for five categories of sealings investigated here proved to be too small. An outcome of this research is knowledge of how to determine sample size: there should be at least 10 observations per variable (Harrell et al, 1984; Peduzzi et al, 1996). This means that if there are three variables, the sample size should contain 30 observations in

order for analyses to produce valid results. Unfortunately, the sample sizes of the different sealing types in my project did not meet this criterion. For example, four sealers produced the bag sealings excavated in Layer VI at Pottery Mound. This means the sample size should have been 40 bag sealings; however, the deposit only yielded five bag sealings, and these five sealings became the sample. In another example, six sealers made the jar sealings. The sample size should have been 60, but the layer only yielded eight jar sealings; therefore, eight sealings became the sample. The lack of large enough sample sizes may be due to poor preservation of identifiable sealings as well as sealers in the archaeological record, inconsistent collection and documentation methods or simply a small number of sealings (i.e. ancient sealers each only produced a few types of sealings). These are issues with which archaeologists have to contend, and, when they lead to small sample sizes, affect the project's analysis and results. The problem of small sample sizes made the results for the five samples in my project untenable and difficult to interpret within the context of Old Kingdom administration at Pottery Mound and Giza.

Second, using the archaeological record of Pottery Mound to discuss the sealers' lived experience of sealing practice is difficult because the correlation between the sealers' daily practice and the stratigraphic relationship among Pottery Mound's different layers is problematic to establish. The lived experience is important in communities of practice theory because it structures the practice; however, it can be hard to delineate in the archaeological record because features, deposits, strata, artifacts and materials do not necessarily indicate which people existed in the same time and space and, importantly, regularly interacted face-to-face. I attempted to mitigate this issue by analyzing sealings excavated in only a single layer. The archaeology indicates Layer VI was deposited in a single large dumping event and was removed from its point of origin in House Unit 1 and discarded directly into Pottery

Mound. These qualifications made Layer VI the most viable layer for analysis; nevertheless, the question of how much time is represented by the layer and whether the sealers whose sealings were excavated in it regularly interacted face-to-face remained unanswered and made discussions of relationships among sealers highly theoretical.

6.2 Key relationships could not be identified with the data

The data failed to provide the necessary evidence for the identification of master-novice relationships at Pottery Mound. The original research proposal was to adopt a methodology to chart the individual sealers' participation levels over time to determine who had more or less experience in a given sealing activity. The intent was to sum the number of sealings per sealing type per sealer in each layer excavated at Pottery Mound and analyze the results with the same statistical analyses used to determine participation levels. The results of this analysis would have been used to discuss potential master-novice relationships among sealers.

Unfortunately, so few sealings were excavated in the other layers (III, IV and V) at Pottery Mound that a statistical analysis of the data could not be performed with valid results. Additionally, the lack of established temporal scale made any discussion of these relationships problematic because it could not be proven specific sealers worked at Pottery Mound at the same time. Even with significant numbers of sealings and a solid temporal scale, an analysis of the data would not have conclusively demonstrated the existence of master-novice relationships. No titles, identified in the seal impressions, described a "teacher" or a "master," and very little of the archaeological evidence excavated with the sealings at Pottery Mound or in House Unit 1 (the likely location of sealing activity) indicates

learning occurred among the sealers. The discarded sealings, discussed in Chapter 3, may indicate some sealers failed to make sealings correctly and had to learn to make them properly; however, this evidence could also be interpreted as simple error and is not conclusive proof of learning to practice.

In addition, the data were inadequate to delineate core-peripheral relations. Participation levels may be used to identify which sealers acted as core or peripheral members for a given period of time, if it is assumed that core members participated to higher degrees than peripheral members. This appears to be a valid assumption, but it needs to be qualified with further research. Several additional studies of ancient sealings, in which participation levels could be determined and summarized, would be necessary to support this assumption, and these will, hopefully, be undertaken in the future.

Consideration of other factors that may have affected an individual sealer's participation levels, and thus their designation as core or peripheral, may also be necessary. For example, whether an individual was active in one sealing activity or in various sealing activities may impact whether he is considered a core or peripheral member. For another example, whether a sealer impacted the sealing practice (and not just participated in it) may also affect whether he is identified as part of the core or periphery. These are questions that archaeology may not be able to answer, but they are, nonetheless, important to consider and to address in order to discuss core-peripheral relations.

A further issue was that neither the data nor stratigraphy could establish how, when or the extent to which knowledge transfer, in the practice of sealing, occurred. Knowledge sharing does not have to happen between a master and novice or between core or peripheral

members; however, without additional evidence (e.g. an instruction manual passed on through generations), it likely occurred among sealers who worked at the same time and in the same space. Evidence for this was lacking at Pottery Mound; therefore, this most interesting aspect of sealing practice could not be discussed.

It must be noted that Wenger does argue learning (i.e. knowledge transfer) can occur across space and through time, but using archaeological evidence to demonstrate how they shared information about sealing practice remains an issue. Establishing an object's or individual's mobility in the archaeological record may be the first step; however, more concrete evidence is needed to really discuss how, when and where, learning occurred. The means by which knowledge is transferred among communities of practice in a constellation is a problematic part of Wenger's original theory, and additional theorizing and research with good case studies is needed to further develop the idea and especially its archaeological correlates.

6.3 Future Studies

A key conclusion of this particular research exercise is that alternative, analytical methods, sealing datasets and even types of administrative data may be more useful in eliciting viable results.

6.3.1 Alternative Approach and Methods

The aim of this research was to explore individual activity and interpersonal relationships within the community of sealers at Pottery Mound through an analysis of seal

impression text and glyptic, sealing shape and size, and a statistical analysis of the categories of sealing type per individual. Although I was able to identify distinct sealers and their activities, a weakness in the methodology may have been in reducing the community to its component members⁹⁰. This suggests that a potentially more productive approach would have been to consider the community as a whole: the types of sealing or sealing-related activities enacted, the physical space in which the practice occurred and the period during which the community was active. In this way, a statistical analysis of sealing types at Pottery Mound would likely shed light on the relevance of different sealing activities and contribute to the characterization of the community as a whole (e.g. did these sealers seal greater or fewer bags, boxes, papyri, etc.). Some categories (e.g. door sealings) would still be too small in number to be useful; however, several other categories are at a sufficient scale where they could be the subject of statistical analysis. An approach that asks, what is the character of this community, rather than, what interpersonal relationships structured this practice within the community, would therefore have greater potential with the specific archaeological data at Pottery Mound.

With this in mind, additional, or alternative approaches might be more effective in producing tenable results. A macroscopic (10x) materials analysis and geochemical methods could be used to determine whether sealings were locally produced based on the clay type (e.g. silty river clays, sandy desert clays, and differentiating between residual and secondary

⁹⁰ It may have been a mistake for the purposes of this thesis. However, individuals in ancient Egypt (e.g. Seshemnefer, Wepemnefret, Ptahshepses) are often identified in text, and their relationships are explored through text and burial arrangement. Communities of practice theory allows for the exploration of the role of individuals in different professional networks through artifacts and other archaeological data as well as text. A different type of project might have focused on a specific ancient Egyptian (e.g. Seshemnefer II, Hemiunu, Meryrener Qau) and explored the different professional networks to which he (or she in alternative cases) belonged.

clays (Rice 2015), and perhaps tempers (e.g. sand, mica, vegetal fibers, dung)⁹¹. Although multiple recipes might exist, there would only be two categories of clay type – local and non-local⁹²; therefore, sample sizes at Pottery Mound would be large enough for viable results⁹³. The results of this type of analysis would then be used to discuss core-periphery relations in the sealing community at Pottery Mound, not on an individual level, but rather on a communal level. Questions about whether the community was very localized, or alternatively inter-local, could be discussed and contextualized within our knowledge of 4th Dynasty administration, economy and labor at Giza.

Additionally, a more rigorous contextual analysis of the objects in their original setting (e.g. House Unit 1) could be used to delineate and describe, more clearly, the space in which these sealers worked. The physical objects they must have come up against and moved around (e.g. the low bench in House Unit 1) and the very ground upon which they walked (e.g. its hardness) would have contributed to their shared sense of place and also to their community. A detailed analysis of the archaeological record, and especially its features, deposits and soils, in House Unit 1 would help inform a discussion of the community's lived experience as they crafted and used their sealings.

⁹¹ Microscopic and geochemical analyses, using non-destructive methods like pXRF or INAA, might also prove useful for pinpointing where in Egypt (or elsewhere) the sealings originated. This would add detail to the discussion on sealings' origins and the community's locality.

⁹² Clays local to the Giza region would likely be siltier due to the proximity of the site to the Nile, and perhaps contain more straw and dung due to the significant number of cattle and other livestock kept in proximity to the site (Chapter 2). However, additional lab analyses are needed to develop a geochemical profile of the site in order to pinpoint Giza as a point of origin rather than another site on along the Nile (e.g. Badreshany et al 2022).

⁹³ An attempt might be made to determine which sealers were core and periphery through a textual analysis of the impressions and identification of individuals; however, this would likely create the problem of small sample sizes if statistical analysis were used to quantify the results.

Finally, object analyses can be used to discuss the shared activities, not on an individual level but as part of the character of the sealing community. This would serve to identify the activities performed by the group and give insight into the type of sealing community in operation in a given space. Stratigraphic analysis of each activity type might also be useful because it could demonstrate whether activities changed or remained the same over time and the reasons why, and how these might be relevant to the community, might be discussed.

6.3.2 Alternative Datasets

Old Kingdom datasets exist that may fit with the criteria identified above. These include the sealings and seal impressions excavated at Elephantine and at Balat. Pätznick (2005) published the Elephantine data, which is comprised of over 1600 seals, sealings and sealing-related objects from well preserved contexts. Pantalacci (2005, 2013, 2021) reported on the Balat corpus and is in the process of compiling an online database⁹⁴ of the nearly 800⁹⁵ seals, sealings and sealing-related objects, many of which were excavated in situ. Both corpora appear robust and promising on the surface, but further research, that employs the parameters outlined in the previous sections, would be needed to determine whether individuals, sealing activities, participation levels and the lived experience, as well as core-periphery dynamics, experience levels and master-novice relationships could indeed be identified and explored. Nevertheless, it seems likely that both datasets may be too small to

⁹⁴ <https://www.ifao.egnet.net/bases/scbalat/scl/>

⁹⁵ More than 3000 seals and sealings were excavated at Balat in contexts dating from the late Old Kingdom to the early Middle Kingdom. Roughly 800 objects excavated in the Old Kingdom palace storerooms have been published in the database, and additional Old Kingdom data may have yet to be reported. Even if that is not the case, the Balat corpora presents a unique opportunity to view changes in provincial administrative practice (and perhaps myriad dynamics) during a lesser known period of Egyptian history.

identify individual relationships and that they may be more useful for discussing the character of the community.

In addition, Elephantine and Balat provide different administrative contexts from Giza. They are located at great distance from the Old Kingdom capital at Memphis, at the southern border (Elephantine) and in the western desert (Balat). It might be interesting to explore the types of sealing communities practicing at these sites (e.g. their practices and activities, sizes, etc.) and compare these with the sealing community at Giza (using the information from this thesis). This would potentially result in a more nuanced understanding of provincial administration in the Old Kingdom.

6.3.3 Alternative Administrative Data Types

Additional data types that might be used to explore administrative organization in the Old Kingdom are seals, written documents (papyri) and tokens. Seals' material, shape, context, text and glyptic and tools can all be analyzed using object, materials and textual analyses. Spatial analyses may also be useful for defining the community in space, and a stratigraphic analysis may be useful for defining it in time or across time. Seals without sealings and seal impressions could be used to explore characteristics of a spatially and temporally given community: the types of materials they used, the shapes they used, the text and glyptic they used to communicate, etc. The cause(s) (e.g. economic or political processes, individual inspirations or addendums/new blood in the community, adaptive responses to environmental pressure) of these choices could be explored, as could any developments (if multiple stratigraphic units were examined). The investigator could also explore who was involved in this community through a textual analysis, and whether these people were

involved in other communities of practices, in order to reconstruct individual interconnected organizations and associations. This might be an individual who functions as, in the words of communities of practice theory, a broker. These people are important to the formation and development of a community of practice, and to communications among different communities of practice. They were important players with vital roles, and they are frequently missing from our knowledge of ancient Egypt. And with good reason: even with communities of practice theory as an aid, it would be difficult to identify an individual and document his or her various associations in the archaeological and historical record.

Despite their promise, seals would not be better than seal impressions and sealings and might even be more difficult because they are often found in small number, which would, of course, create the issue of a small sample size. Although, analyzed as a group (defined through spatial and stratigraphic analysis), where the only division is by material or shape, they might be employed to define that particular group of sealers and explore the causes of their choices of material and shape. This might provide insight into seal production and organization within Old Kingdom administration.

Papyrus material/clays, ink, handwriting style and text (both the content and what it can tell you about ancient Egypt) could all be analyzed in order to explore the community of scribal practice. Spatial and stratigraphic analysis could be used to define the community in space and time, and an analysis of the material, ink and content could be used to explore certain practices and their causes. Again, an individual would be hard to identify (unless through handwriting style, maybe); thus, analysis on that level would not be viable. However, it might be interesting to consider different administrative scribal communities and the different or similar materials, styles and content they used and documented. The content of

the text might also be useful for exploring not only what the community focused on in ancient Egyptian administration but also how the administration was organized (from a political, social, economic, etc. point of view). The Abusir papyri, for example, describe the organization of royal funerary cults during the 5th Dynasty. This would be an interesting group of artifacts to explore if one were also able to test the papyri and ink, analyze the handwriting styles and explore the depths of its content.

Although such objects present interesting opportunities, papyri and tablets are not likely to be better administrative tools for analysis than seal impressions. This is primarily because it is unclear whether the papyri, ink and handwriting styles could be studied to any useful degree. The geographical sources of Old Kingdom papyri and ink cannot always be identified, and handwriting styles are often difficult to decipher and assign to a particular person or group. It therefore seems preferable to use them only as supporting evidence alongside seals or seal impressions when discussing the formal and informal organization of ancient Egyptian administration or when exploring links among individual administrators.

Tokens may be explored through their materials, shapes, glyphs or texts, etc. These different aspects of the token could be analyzed (object types, materials) to explore specific communities of practice and how they interact, grow and change, and according to what external, or perhaps even internal, factors. Additionally, spatial analysis may be used to “identify” a community within acceptable geographic parameters. Unlike seals or seal impressions, individuals have never been identified using tokens; therefore, questions and analyses about the role of individuals who practiced with tokens are not possible. Categories of analysis would then be reliant on shape or material or another aspect of the token, and perhaps negate the problem of small sample sizes. However, when caches of

tokens are excavated in Egypt, they tend to be small. This might still create the problem of a small sample size in the end, but only by trying can we determine whether it will work or not. It may also be possible to use communities of practice to simply define the character of the community of token practice: what types of materials they used, what types of shapes that community made, etc. and then ask what factors or processes (e.g. political, environmental, economic, etc.) caused these choices.

Ultimately, tokens would not be a better class of artifacts to study with communities of practice because too few of them have been excavated in the archaeological record of ancient Egypt. Even categorized by material or type, this might create the small sample size I struggled against in this thesis.

Conclusion

To reiterate, an approach that explores community relations and practice, rather than individual relations and practice, is more appropriate for the dataset of sealings at Pottery Mound. Methods that can be used to analyze data at the community level include materials, object and spatial analyses. These results are important and will be useful to scholars approaching their evidence through the lens of community of practice theory. Alternative sealing datasets, and perhaps even data types, might also be useful, combined with the analytical methods described, when considering administrative practice, organization and knowledge.

6.4 Additional Considerations

Egyptian archaeology can contribute to communities of practice theory, including applying the theory to other aspects of shared practice beyond that of administration, whether that be the production of ceramics, amulets or palettes. Each object type would need to be situated in its own historical and social contexts, but questions comparable to those asked in this work would make useful starting points, potentially illuminating the way in which practitioners learned and shared their knowledge.

The dynamic nature of objects and their impact on learning, practice and interactivity is not explored in Wenger's (1998) original publication. He (1998) suggests materials help practitioners learn to practice and reify their membership within the community but does not describe the relationships in detail nor what aspects of the materials are best suited for learning and participation. Additional uses of communities of practice within education and other disciplines also do not explore these relationships nor the artifacts to a significant extent: occasionally, specific objects are examined in case studies, but the focus often remains on the practice, interpersonal relationships and learning within the community of practice. Archaeological theories can remedy this issue with their abundant discourse on objects, materials and data available for case studies.

Finally, communities of practice may be used to investigate and develop Egyptological practice. Egyptian archaeology has developed much more reflective approaches over the last decade. Alongside the development of new analytical methods, researchers have engaged with the discipline's history and past agendas and in so doing are increasingly adopting strategies for greater inclusion. The latter has been particularly impacted by social

movements outside Egyptology. The rise of #MeToo and Black Lives Matter has encouraged scholars to examine the field's sexist, colonialist and racist histories and to create projects such as Egypt's Dispersed Heritage (el-Gawad and Stevenson 2021) and Interdisciplinary Egyptology⁹⁶ in order to combat exclusivity and incorporate multiple perspectives. Egyptology is examining its past, engaging with the outside world and moving forward.

In this self-reflective climate, another question may be asked: what does it mean to practice Egyptology? Research on this topic is minimal even though it is key to the endurance and development of Egyptology. Communities of practice can be used to explore this question and highlight the relationships, shared activities and educational experiences that define Egyptology. It can also be used to examine the degree of continuity in Egyptological practice itself among Egyptologists who work or were trained in different institutions and who are from diverse cultural backgrounds. Communities of practice theory can additionally be used to explore the intersection between the public, but who are not Egyptologists, and the field of Egyptology. Who are these people, how, where and why do they engage with the field and what influence do they have on practice are questions communities of practice can be used to develop and investigate. Knowledge gathered from these types of studies could be used to develop and advance the discipline through the implementation of administrative procedures designed in response to this self-reflection. Communities of practice is therefore a tool which may prove useful in thinking about the past but may have greater use in thinking about the discipline's future.

⁹⁶ <https://journals.univie.ac.at/index.php/integ/index>

Bibliography

- Abd el-Aziz, A. 2007. Gallery III.4 Excavations. In: Lehner, M. and Wetterstrom, W. (eds.) *Giza Reports. Giza Plateau Mapping Project. Volume 1*. Boston: AERA, Inc., 193-234.
- Abd el-Aziz, A. 2015. Prolific Pedestals: a preliminary report on area Main Street East. In: Sadarangani, F. and Witsell, A. (eds.) *Settlement and Cemetery at Giza: reports from the 2010 AERA-ARCE field school*. Boston: AERA.
- AERA Annual Reports. 2009-2010. Prying into Ancient Lives. A New King and An Imported Thing. *Annual Reports 2009-2010*, 15-17.
- AERA Annual Reports. 2010-2011a. A Hundred and One Years Later: peering into the Menkaure Valley Temple. *Annual Reports 2010-2011*, 10-13.
- AERA Annual Reports. 2010-2011b. Ancient Foods, Environment and Climate: archaeological science program. *Annual Reports 2010-2011*, 22-25.
- AERA Annual Reports. 2011-2012. 2012 Field Season Excavations: the Silo Building Complex. *Annual Reports 2011-2012*, 6-9.
- AERA Annual Reports. 2012-2013. A Run of Royal Favor. *Annual Reports 2012-2013*, 6-7.
- AERA Annual Reports. 2013-2014. The Silo Building Complex. *Annual Reports 2013-2014*, 6-8.
- AERA Annual Reports. 2018-2019. Field Lab 2019. *Annual Reports 2018-2019*, 7.
- AERA Blog. 2019. New Findings from Menkaure Valley Temple.
<http://www.aeraweb.org/news/new-findings-from-the-menkaure-valley-temple/>.
Accessed 12/6/20.
- Allen, M. 2005. Power is in the Details: administrative technology and the growth of ancient Near Eastern cores. In: Chase-Dunn, C. and Anderson, E. (eds.) *The Historical Evolution of World-Systems*. The Evolutionary Process in World Political Series. New York: Palgrave Macmillan, 75-91.
- Allon, N. and Navratilova, H. 2017. *Ancient Egyptian Scribes: a cultural exploration*. London: Bloomsbury Academic.
- Amiet, P. Il y a 5000 ans les Elamites inventaient l'Ecriture. *Archeologia* 12, 16-23.
- Anderson, B. 1983. *Imagined Communities*. London and New York: Verso.
- Anderson, E. 2016. *Seals, Craft and Community in Bronze Age Crete*. Cambridge: Cambridge University Press.

- Arthur, L. 2016. Communities of Practice in Higher Education: professional learning in an academic career. *International Journal for Academic Development* 21, 230-241.
- Badreshany, K., Sowada, K., Ownby, M., Jean, M., De Vreeze, M., McClymont, A. and Philip, G. 2022. The Characterisation of Ceramic Production from the Central Levant and Egyptian trade in the Pyramid Age. *Journal of Archaeological Science: Reports* 41.
- Baer, K. 1960. *Rank and Title in the Old Kingdom*. Chicago: University of Chicago Press.
- Baines, J. 1983. Literacy and Ancient Egyptian Society. *Man* 18, 572-599.
- Baud, M. 1999. *Famille royale et pouvoir sous l'Ancien Empire égyptien. Vol. 1 and 2*. Cairo: IFAO.
- Baud, M. 2006. Dynasties 6 and 8. In: Hornung, E., Krauss, R. and Warburton, B. (eds.) *Ancient Egyptian Chronology*. Leiden: Brill, 144-158.
- Baud, M. 2010. The Old Kingdom. In: Lloyd, A. (eds.) *A Companion to Ancient Egypt*. Oxford: Blackwell Publishing Ltd., 63-80.
- Berry, R. 1969. Cylinder Seal Mineralogy and Petrology. *American Journal of Archaeology* 73, 67-69.
- Beuthe, T. 2016. *Seals and Sealing Practices in Early Administration in Southwestern Asia and Egypt During the Fourth to Third Millennium BCE*. PhD Dissertation. University College London.
- Bilgin, T. 2018. *Officials and Administration in the Hittite World*. Berlin: De Gruyter.
- Blöbaum, A. 2021. Types of Sealings and Sealed Objects: main features and main aspects. In: Engle, E., Blöbaum, A. and Kammerzell, F. (eds.) *Keep Out! Early Dynastic and Old Kingdom Seals and Sealings in Context*. Wiesbaden: Harrassowitz, 257-288.
- Boehmer, R. 1974. Das Rollsiegel im Prädynastischen Ägypten. *Archäologischer Anzeiger* 4, 497-503.
- Borchardt, L. 1907. 4. Ausgrabungen bei Abusîr. Januar bis Juni 1907. *MDOG* 34, 32-45.
- Borgatti, S. and Ofem, B. 2010. Overview: Social Network Theory and Analysis. In: Daly, A. (ed.) *Social Network Theory and Educational Change*. Cambridge: Harvard Education Press, 17-29.
- Bourdieu, P. 1977. *Outline of a Theory of Practice*. Cambridge: Cambridge University Press.
- Bussmann, R. 2011. Local Traditions in Early Egyptian Temples. In: Friedman, R. and Fiske, P. (eds.) *Egypt at Its Origins 3*. Leuven: Peeters Publishing, 747-762.
- Bussmann, R. 2013. Administration Without Writing. *Nekhen News* 25, 23-24.

- Bussmann, R. 2015a. Pyramid Age: Huni to Radjedef. University of California, Los Angeles Encyclopedia of Egyptology.
- Bussmann, R. 2015b. Egyptian Archaeology and Social Anthropology. Oxford Handbooks Online. DOI: 10.1093/oxfordhb/9780199935413.013.24.
- Byrne, S. 2012. Community Archaeology as Knowledge Management: reflections from Uneapa Island, Papua New Guinea. *Public Archaeology* 11, 26-52.
- Caldwell, B. 2008. Networking Knowledge to Achieve Transformation in Schools. In: Kimble, C. and Hildreth, P. (eds.) *Communities of Practice Vol. 1: creating learning environments for educators*. Charlotte: Information Age Publishing, Inc., 1-20.
- Chollier, V. 2019. Social Network Analysis in Egyptology: benefits, methods and limits. *JEA* 105, 83-96.
- Collon, D. 2006. *First Impressions: cylinder seals in the ancient Near East*. London: British Museum.
- Cooney, K. 2012. Apprenticeship and Figured Ostraca from the Ancient Egyptian Village of Deir el-Medina. In: Wendrich, W. (ed.) *Archaeology and Apprenticeship. Body Knowledge, Identity and Communities of Practice*. Tucson: University of Arizona Press, 145-170.
- Conrad, N. and Lehner, M. 2001. The 1988/1989 Excavation of Petrie's 'Workmen's Barracks' at Giza. *JARCE* 38, 21-60.
- Cordell, L. and Habicht-Mauche, J. (ed.) 2006. *Potters and Communities of Practice*. Tucson: University of Arizona Press.
- Crown, P. 1994. *Ceramics and Ideology: Salado Polychrome Pottery*. Albuquerque: University of New Mexico Press.
- Crumley, C. 1992. Contextual Constraints on State Structure. In: Bondarenko, D. and Nemirovskiy, A. (eds.) *Third International Conference Hierarchy and Power in the History of Civilizations*. Moscow: Center for Civilization and Regional Studies of the RAS, 3-22.
- Darvill, T. 2009. Seriation. *The Concise Oxford Dictionary of Archaeology*. Oxford: Oxford University Press, 195.
- Dee, M. 2013a. A Radiocarbon-based Chronology for the Old Kingdom. In: Shortland, A. and Bronk Ramsey, C. (eds.) *Radiocarbon and the Chronologies of Ancient Egypt*. Oxford: Oxbow Books, 209-217.
- Dee, M. 2013b. A radiocarbon-based Chronology for the New Kingdom. In: Shortland, A. and Bronk Ramsey, C. (eds.) *Radiocarbon and the Chronologies of Ancient Egypt*. Oxford: Oxbow Books, 65-75.

- Dee, M., Wengrow, D., Shortland, A., Stevenson, A., Brock, F., Flink, L. and Bronk-Ramsey, C. 2013. An Absolute Chronology for Early Egypt Using Radiocarbon Dating and Bayesian Statistical Modelling. *Proceedings of the Royal Society A* 469 20130395 <<https://royalsocietypublishing.org/doi/10.1098/rspa.2013.0395>>.
- Delnaro, P. 2010. Sumerian Extract Tablets and Scribal Education. *JCS* 62, 53-69.
- Dillery, J. 1999. The First Egyptian Narrative History: Manetho and Greek historiography. *ZPE* 127, 93-116.
- Dobrev, V. 2006. Old Kingdom Tombs at Tabbet al-Guesh (South Saqqara). In: Barta, M., Coppens, F. and Krejci, J. (eds.) *Abusir and Saqqara in the Year 2005*. Prague: Czech Institute of Egyptology, Faculty of Arts, Charles University, 229-235.
- Dolwick, J. 2009. The Social and Beyond. Introducing Actor-Network Theory. *Journal of Maritime Archaeology* 4, 21-49.
- Dorman, P. 2002. The Biographical Inscription of Ptahshepses from Saqqara: a newly identified fragment. *JEA* 88, 95-110.
- Doxey, D. 2001. Priesthood. In Redford, D. (ed.) *The Oxford Encyclopedia of Ancient Egypt*. Oxford: Oxford University Press.
- Dubiel, U. 2008. *Amulette, Siegel und Perlen. Studien zu Typologie und Tragesitte im Alten und Mittleren Reich*. Orbis Biblicus et Orientalis 229. Göttingen: Vandenhoe and Ruprecht.
- Duell, P. 1938. *The Mastaba of Mereruka Parts I and II*. Chicago: The University of Chicago Press.
- Duistermaat, K. 2012. Which came First, the Bureaucrat of the Seal? Some Thoughts on the Non-Administrative Origins of Seals in Neolithic Syria. In: Regulski, I., Duistermaat, K. and Verkinderen, P. (eds.) *Seals and Sealing Practices from Ancient Times until Present Day. Developments in Administration and Magic Through Cultures*. Leuven: Peeters Publishing, 1-16.
- El-Khadragy, M. 2002. The Edfu Offering Niche of Qar in the Cairo Museum. *SÄK* 30, 203-228.
- El-Sohby, M., Aboushook, M. and Mazen, O. 2004. Slope Degradation and Analysis of Mokattam Plateau, Egypt. In: Viana da Fonesca, A. and Mayne, P. (eds.) *Geotechnical and Geophysical Site Characterization: proceedings of the second international conference on site characterization, ISC-2 Porto, Portugal 19-22 September 2004*. Millpress, 1881-1887.
- Emery, W. 1963. Egyptian Exploration Society: Preliminary Report on the Excavations at Buhen, 1962. *Kush* 11, 116-120.

- Engle, E. 2013. The Organization of a Nascent State: Egypt until the beginning of the 4th dynasty. In: Moreno-Garcia, J.C. (ed.) *Ancient Egyptian Administration*. Leiden: Brill, 19-39.
- Engel, E. 2021. Three Sites – One Administration? In: Engel, E., Blöbaum, A. and Kammerzell, F. 2021. *Keep Out! Early Dynastic and Old Kingdom Seals and Sealings in Context*. Wiesbaden: Harrassowitz, 193-216.
- Engel, E., Blöbaum, A. and Kammerzell, F. 2021. *Keep Out! Early Dynastic and Old Kingdom Seals and Sealings in Context*. Wiesbaden: Harrassowitz.
- Engel, E. and Müller, V. 2000. Verschlüsse der Frühzeit: erstellung einer Typologie. *GM* 178, 31-44.
- Eyre, C. 2011. Patronage, Power and Corruption in Pharaonic Egypt. *International Journal of Public Administration* 34, 701-711.
- Eyre, C. 2013. *The Use of Documents in Pharaonic Egypt*. Oxford: Oxford University Press.
- Ferioli, P. and Fiandra, E. 2007. Chapter 3. Sealed Objects, Closing and Sealing Practices Reconstructed from the Cretulae. The Two Main Corpora of Administrative Materials: an initial and final stage in the procedures. In: Frangipane, M., Ferioli, P., Fiandra, E., Laurito, R. and Pittman, H. (eds.) *Arslantepe Cretulae: an early centralized administrative system before writing*. Rome: Missione Archaeologica Italiana nell'Anatolia Orientale, 68-111.
- Fiandra, E. 1968. A che cosa servivano le cretule di Festos. *Proceedings of the Second International Cretological Congress*. Athens, 282-297.
- Fiandra, E. and Ferioli, P. 1981. A Proposal for a Multi-Stage Approach to Research on Clay Sealings in Protohistorical Administrative Procedures. *South Asian Archaeology*. Cambridge: Cambridge University Press, 124-127.
- Fischer, H. 1972. Old Kingdom Cylinder Seals for the Lower Classes. *Metropolitan Museum Journal* 6, 5-16.
- Flentye, L. 2007. The Mastabas of Ankh-haf (G 7510) and Akhetep and Meretites (G 7650) in the Eastern Cemetery at Giza: a reassessment. In: Hawass, Z. and Richards, J. (eds.) *The Archaeology and Art of Ancient Egypt. Essays in Honor of David B. O'Connor Vol. 1*. ASAE 36. Cairo: Supreme Council of Antiquities, 291-308.
- Frankfort, H. 1939. *Cylinder Seals: a documentary essay on the art and religion of the ancient Near East*. London: Macmillan.
- Friberg, J. 1994. Preliterate Counting and Accounting in the dle East: a constructively critical review of Schmandt-Besserat's *Before Writing*. *Orientalische Literaturzeitung* 89, 477-502.
- Gatto, M. 2015. Cultural Entanglement at the Dawn of the Egyptian History: a view from the Nile first cataract region. *Origini* XXXVI, 93-123.

- Goelet, O. 1982. *Two Aspects of the Royal Palace in the Egyptian Old Kingdom*. Columbia University.
- Gorelick, L. and Gwinnett, J. 1981. The Origin and Development of the Ancient Near Eastern Cylinder Seal. *Expedition* 23, 17-30.
- Gorelick, L. and Gwinnett, J. 1990. The Ancient Near Eastern Cylinder Seal as a Social Emblem and Status Symbol. *JNES* 49, 45-56.
- Gorelick, L. and Gwinnett, J. 1996. Innovative Methods in the Manufacture of Sasanian Seals. *Iran* 34, 79-84.
- Gibson, J. 2014 (1979). *An Ecological Approach to Visual Perception*. New York and London: Psychology Press.
- Giddens, A. 1984. *The Constitution of Society. Outline of a Theory of Practice*. Berkeley: University of California Press.
- Gosden, C. and Marshall, Y. 1999. The Cultural Biography of Objects. *World Archaeology* 31, 169-178.
- Grajetzki, W. 2013. Setting a State Anew: the central administration from the end of the Old Kingdom to the end of the Middle Kingdom. In: Moreno-Garcia, J. (ed.) *Ancient Egyptian Administration*. Leiden: Brill, 215-258.
- Gundacker, R. 2015. The Chronology of the Third and Fourth Dynasties According to Manetho's Aegyptiaca. In: Der Manuelian, P. and Schneider, T. (eds.) *Towards a New History for the Egyptian Old Kingdom*. Leiden: Brill, 76-199.
- Gurshtein, A. 2000. The Revelation of the Egyptian Calendar: was the pharaoh Akhenaten a heretic? In: Esteban, C. and Belmonte, J. (eds.) *Astronomy and Cultural Diversity*. La Laguna: Organismo de Museo del Cabildo de Tenerife.
- Gwinnett, A. and Gorelick, L. 1987. The Change from Stone Drills to Copper Drills in Bronze Age Mesopotamia. *Expedition* 29, 15-24.
- Harrell, F., Lee, K., Califf, R., Pryor, D. and Rosati, R. 1984. Regression Modelling Strategies for Improved Prognostic Prediction. *Stat Med* 3:2, 143-152.
- Hartmann, R. 2021. Remarks on Seal Impressions from the Excavations of the German Archaeological Institute Caro in the Tomb of Peribsen at Abydos. In: In: Engle, E., Blöbaum, A. and Kammerzell, F. (eds.) *Keep Out! Early Dynastic and Old Kingdom Seals and Sealings in Context*. Wiesbaden: Harrassowitz, 155-178.
- Hartung, U. 1998. Prädynastische Siegelabrollungen aus dem Friedhof U in Abydos (Umm el-Qaab). *MDAIK* 54, 188-217.
- Hassan, S. 1943. *Excavations at Giza 1932-1933. Vol IV*. Cairo: Government Press.

- Hassan, S. 1953. *Excavations at Giza VIII 1936-1937. The Great Sphinx and Its Secrets. Historical Studies in the Light of Recent Excavations*. Cairo: Government Press.
- Hassan, S. 1960. *Excavations at Giza X 1938-1939. The Great Pyramid of Khufu and Its Mortuary Chapel*. Cairo: Government Press.
- Hawass, Z. and Senussi, A. 2008. *Old Kingdom Pottery from Giza*. Cairo: Supreme Council of Antiquities.
- Hawass, Z. 2009. Women in the Worker's Cemetery at Giza. In: *Silent Images: women in pharaonic Egypt*. New York: Abrams, 148-157.
- Heidegger, M. 2008 (1927). *Being and Time*. New York: Harper and Row Publishers, Inc.
- Helck, W. 2014. Chronology: Egyptian. *Encyclopedia Britannica*.
- Hill, J. 2004. *Cylinder Seal Glyptic in Predynastic Egypt and Neighboring Regions*. Oxford: Archaeopress.
- Hodder, I. 2012. *Entangled: an archaeology of the relationship between humans and things*. Oxford: Wiley-Blackwell.
- Hood, A. and Schwenninger, J. 2015. Optically Stimulated Luminescence (OSL) Dating and Its Application to Ancient Egyptian Ceramics in the 21st Century. In: Bader, B., Knoblauch, C. and Köhler, C. (eds.) *Vienna 2. Ancient Egyptian Ceramics in the 21st Century*. *Orientalia Lovaniensia Analecta* 245. Leuven: Peeters Publishing, 287-298.
- Hood, A., Köhler, C., Highcock, E. and Schwenninger, J. 2019. Luminescence as a Relative Dating Tool: Part B-Application. *Ancient TL* 37, 14-20.
- Honore, E. 2007. Earliest Cylinder-Seal Glyptic in Egypt: from greater Mesopotamia to Naqada. In: Hanna, H. (ed.) *The International Conference on Heritage of Naqada and Qus Region*, Vol. 1. Cairo: Government Press, 31-45.
- Hornung, E., Krauss, R., and Warburton, D. (eds.) 2006. *Ancient Egyptian Chronology*. Leiden: Brill.
- Howley, K. and Nyord, R. 2018. *Egyptology and Anthropology: historiography, theoretical exchange and conceptual development*. Scott's Valley: CreateSpace Independent Publishing Platform.
- Huntley, D., Fenn, T., Habicht-Mauche, J., and Mills, B. 2012. Embedded Networks? Pigments and Long-Distance Procurement Strategies in the Late Prehispanic Southwest. In: Cordell, L. and Habicht-Mauche, J. (ed.) *Potters and Communities of Practice*. Tucson: University of Arizona Press, 8-18.
- Ingham, M. 1969. The Length of the Sothic Cycle. *JEA* 55, 36-40.
- Janosi, P. 2006. Old Kingdom Tombs and Dating – Problems and Priorities. The Cemetery en Échelon at Giza. In: Barta, M. (ed.) *The Old Kingdom Art and Archaeology*:

Proceedings of the Conference Held in Prague, May 31-June 4, 2004. Prague: Czech Institute of Egyptology, 175-183.

Janssen, R. and Jac, J. 1990. *Growing Up in Ancient Egypt*. London: Rubicon, 67-89.

Jasim, S. and Oates, J. 1986. Early Tokens and Tablets in Mesopotamia: new information from Tell Abada and Tell Brak. *World Archaeology* 17, 348-362.

Jerabek, D. 2018. Clay Sealings from the Pyramid Complex of Raneferef Kept in the Náprstek Museum: general features of the corpus and its potential to the study of the administration of the royal funerary cult. *Annals of the Náprstek Museum* 39, 19-38.

Jigoulov, V. 2009. Administration of Achaemenid Phoenicia: a case for managed autonomy. In: Grabbe, L., Knoppers, G. and Lipschits, O. (eds.) *Exile and Restoration Revisited: essays on the Babylonia and Persian period in memory of Peter Ackroyd*. London: T & T Clark International, 138-151.

Jones, D. 2000. *An Index of Ancient Egyptian Titles, Epithets, and Phrases of the Old Kingdom*. Oxford: Archaeopress.

Jordan, B. 1989. Cosmopolitan Obstetrics: some insights from the training of traditional midwives. *Social Science Medicine* 28, 925-944.

Joy, J. 2009. Reinvigorating Object Biography: reproducing the drama of object lives. *World Archaeology* 41, 540-556.

Joyce, R. and Meskell, L. 2014. *Embodied Lives. Figuring Ancient Maya and Egyptian Experience*. London: Routledge.

Junker, H. 1944. *Giza VII*. Wein: Holder-Pichler-Tempsky.

Junker, H. 1951. *Giza 10. Das Friedhof südlich der Cheopspyramide: Westteil*. Vienna: Rudolph M. Rohrer.

Junker, H. 1953. *Giza 11. Das Friedhof südlich der Cheopspyramide: Ostteil*. Vienna: Rudolph M. Rohrer.

Kaiser, J. 2011. Human Osteology, 2009. In: Lehner, M. (ed.) 2011. *Giza Plateau Mapping Project Season 2009 Preliminary Report. Giza Occasional Papers 5*. Boston: AERA, Inc., 183-196.

Kanawati, N. 2002. *Tombs at Giza. Vol. 2: Seshathetep/Heti (G5150), Nesutnefer (G4970) and Seshemnefer II (G5080)*. ACER 18. Warminster: Aris and Phillips.

Kaplony, P. 1963. *Die Inschriften der Agyptischen Frühzeit*. Wiesbaden: Harrassowitz.

Kaplony, P. 1969. Die Siegelabdrücke. In: Ricke, H. (ed.) *Das Sonnenheiligtum des Königs Userkaf, Band II*. Wiesbaden: Schweizerisches Institut für Ägyptische Bauforschung und Altertumskunde, 83-114.

- Kaplony, P. 1977. *Die Rollsiegel des Alten Reichs I: Allgemeiner Teil mit Studien zum Königtum des Alten Reiches*. Monumenta Aegyptiaca 2. Brussels: Fondation Égyptologique Reine Elisabeth.
- Kaplony, P. 1978. Zur Definition der Beschriftung- und Bebilderungstypen von Rollsiegeln, Skarabäen und anderen Stempelsiegeln (mit 67 Abbildungen). *GM* 29, 47-60.
- Kaplony, P. 1981. *Die Rollsiegel des Alten Reichs: IIA-B. Katalog der Rollsiegel, Text und Tafeln*. Monumenta Aegyptiaca 3A-3B. Brussels: Fondation Égyptologique Reine Elisabeth.
- Kaplony, P. 1983. Rollsiegel. *Lexikon der Ägyptologie* 5. Wiesbaden: Harrassowitz, 294-299.
- Kawae, N. 2009. House Unit 1. In: Lehner, M., Kamel, M., and Tavares, A. (eds.). 2009. *Giza Plateau Mapping Project Season 2006-2007 Preliminary Report. Giza Occasional Papers* 3. Boston: AERA, Inc., 87-91.
- Kemp, B. 2006. *Anatomy of a Civilization*. London and New York: Routledge.
- Khayani, A. and Niknami, K. 2020. More Early Bronze Age Seal Impressions from Choga Maran, Western Central Zagros. *Iran* 58, 1-14.
- Kilroe, L. 2019. *Invisible Archaeologies. Hidden Aspects of Daily Life in Ancient Egypt and Nubia*. Oxford: Archaeopress.
- Kitchen, K. 1991. The Chronology of Ancient Egypt. *World Archaeology* 23, 201-208.
- Knappett, C. 2011. Meso-Networks. In: Knappett, C. *An Archaeology of Interaction: network perspectives on material culture and society*. Oxford: Oxford University Press, 98-123.
- Knappett, C. 2013. Introduction: why networks. In: Knappett, C. (ed.) *Network Analysis in Archaeology: new approaches to regional interaction*. Oxford: Oxford University Press, 3-16.
- Kopytoff, I. 1986. The Cultural Biography of Things: commoditization as process. In: Appadurai, A. (ed.) *The Social Life of Things*. Cambridge: Cambridge University Press.
- Krauss, R. 2006a. Lunar Days, Lunar Months and the Question of the Civil Based Lunar Calendar. In: Hornung, E., Krauss, R. and Warburton, B. (eds.) *Ancient Egyptian Chronology*. Leiden: Brill, 386-391.
- Krauss, R. 2006b. Lunar Dates. In: Hornung, E., Krauss, R. and Warburton, B. (eds.) *Ancient Egyptian Chronology*. Leiden: Brill, 392-431.
- Krauss, R. and Warburton, D. 2009. The Basis for the Egyptian Dates. In: Warburton, D. (ed.) *Time's Up! Dating the Minoan Eruption of Santorini*. Athens: The Danish Institute at Athens, 125-144.

- Kromer, K. 1978. *Siedlungsfunde aus dem frühen Alten Reich in Giseh: Österreichische Ausgrabungen, 1971-1975*. Vienna: Österreichische Akademie der Wissenschaften.
- Lambert, M. 1966. Pourquoi l'écriture est née en Mesopotamie. *Archeologia* 12, 24-31.
- Lave, J. and Wenger, E. 1991. *Situated Learning*. Cambridge: Cambridge University Press.
- Lehner, M. 1997. *The Complete Pyramids*. London: Thames and Hudson.
- Lehner, M. 1999. Dating the Pyramids. *Archaeology* 52, 26-33.
- Lehner, M. 2002. The Pyramid Age Settlement of the Southern Mount at Giza. *JARCE* 39, 27-79.
- Lehner, M. 2007. Introduction to the Gallery III.4 Excavations. In: Lehner, M. and Wetterstrom, W. (eds.) *Giza Reports. Giza Plateau Mapping Project. Volume 1*. Boston: AERA, Inc., 183-192.
- Lehner, M. 2008. Archaeological Science: deciphering ancient code. *AERAGram* 9, 2-3.
- Lehner, M. (ed.) 2011. *Giza Plateau Mapping Project Season 2009 Preliminary Report. Giza Occasional Papers 5*. Boston: AERA, Inc.
- Lehner, M. 2013. The Heit el-Ghurob Site Reveals a New Face: the lost port city of the pyramids. *AERAGram* 14, 2-7.
- Lehner, M. 2014. On the Waterfront: canals and harbors in the time of Giza pyramid-building. *AERAGram* 15, 14-23.
- Lehner, M. 2015a. The Monuments and formerly So-Called Valley Temple of Khentkawes I: four observations. In: Coppens, F., Janak, J. and Vymazalova, H. (eds.) *Royal Versus Divine Authority. 7th Symposium on Egyptian Royal Ideology*. Wiesbaden: Harrassowitz, 215-274.
- Lehner, M. 2015b. Labor and the Pyramids. The Heit el-Ghurab "Workers Town" at Giza. In: Steinkeller, P. and Hudson, M. (eds.) *Labor in the Ancient World*. Dresden: Islet-Verlag, 397-522.
- Lehner, M. and Hawass Z. 2017. *Giza and the Pyramids*. London: Thames and Hudson, Ltd.
- Lehner, M., Kamel, M., and Tavares, A. (eds.). 2009. *Giza Plateau Mapping Project Season 2006-2007 Preliminary Report. Giza Occasional Papers 3*. Boston: AERA, Inc.
- Lehner, M., Wetterstrom, W. and Witsell, A. 2012. Conundrums and Surprises: the Silo Building Complex. *AERAGram* 13, 6-9.
- Lehner, M., Wetterstrom, W. and Witsell, A. 2014. Season 2015. Doing Science at Giza. *AERAGram* 15, 10-13.
- Lehner, M., Wetterstrom, W. and Witsell, A. 2018a. Kromer 2018: basket by basket. *AERAGram* 19, 2-9.

- Lehner, M., Wetterstrom, W. and Witsell, A. 2018b. Kromer in Context: biography of an ancient dump. *AERAGram* 19, 2-13.
- Lepsius, K. 1842. *Auswahl der wichtigsten Urkunden des aegyptischen Altertums*. Leipzig: C. Wigand.
- Leys, C., Ley, C. Klein, O., Bernard, P. and Licata, L. 2013. Detecting outliers: Do not use standard deviation around the mean, use absolute deviation around the median. *Journal of Experimental Social Psychology* 49: 764-766.
- Loktionov, A. 2020. The First Lawyers? Judicial Offices, Administration and Legal Pluralism in Ancient Egypt, ca. 2500-1800 bce. In: Cavanaugh, E. (ed.) *Empire and Legal Thought. Ideas and Institutions from Antiquity to Modernity*. Leiden: Brill, 36-68.
- Lichtheim, M. 1975. *Ancient Egyptian Literature Volume 1. The Old and Middle Kingdoms*. Berkeley: University of California Press.
- Lipschits, O. and Vanderehooft, D. 2014. Continuity and Change in the Persian Period Judahite Stamped Jar Administration. In: Frevel, C. Pyschny, K. and Izak, C. (eds.) *A "Religious Revolution" in Yehûd?: the material culture of the Persian Period as a Test Case*. Fribourg: Academic Press, 43-66.
- Lündstrom, P. 2021. *Saqqara Canon*. Creative Commons. Jan. 15, 2021. <<https://pharaoh.se/saqqara-canon>>.
- Lüstig, J. 1997. *Anthropology and Egyptology: a developing dialogue*. Sheffield: Sheffield Academic Press.
- Lyons, P. and Clark, J. 2012. A Community of Practice in Diaspora: the rise and demise of Roosevelt Red Ware. In: Cordell, L. and Habicht-Mauche, J. (ed.) *Potters and Communities of Practice*. Tucson: University of Arizona Press, 19-33.
- MacGinnis, J., Monroe, M., Wicke, D. and Matney, T. 2014. Artefacts of Cognition: the use of clay tokens in a Neo-Assyrian provincial administration. *Cambridge Archaeological Journal* 24, 289-306.
- Magli, G. 2010. Geometry and Perspective in the Landscape of the Saqqara Pyramids. 9th *International Conference Aplimat*. Bratislava: Faculty of Mechanical Engineering, 633-644.
- Manning, S. 2006. Radiocarbon Dating and Egyptian Chronology. In: Hornung, E., Krauss, R. and Warburton, B. (eds.) *Ancient Egyptian Chronology*. Leiden: Brill, 327-355.
- Manzanilla, L. and Rothman, M. 2016. *Storage in Ancient Complex Societies: administration, organization and control*. London: Routledge.
- Marriette, A. 1889. *Les Mastabas de l'Ancien Empire: fragments du dernier ouvrage*. Paris: F. Vieweg.

- Martinet, E. 2019. *L'administration provinciale sous l'ancien Empire égyptien. Vol. 1 and 2.* Probleme der Ägyptologie 38. Leiden: Brill.
- Martinet, E. 2020. Analyzing the dynamics among social groups and the mechanisms of social promotion in the provinces in the late Old Kingdom: SNA methods and new research approaches... In: Dulikova, V. and Barta, M. (eds.) *Addressing the Dynamics of Change in Ancient Egypt: complex network analysis*. Prague: Charles University Faculty of Arts, 71-95.
- Maspero, G. 1878. *Histoire ancienne des peuples de l'orient classique, I. Les origins. Egypt and Chaldee*. Paris.
- Meskel, L. 1999. *Archaeologies of Social Life*. Oxford: Blackwell.
- Meskel, L. 2004. *Object Worlds in Ancient Egypt. Material Biographies Past and Present*. Oxford: Berg Publishers.
- Michalowski, P. 1993. Review of Schmandt-Besserat, *Before Writing*. *American Anthropologist* 95, 996-999.
- Mills, A. and Kaper, O. 2003. 'Ain el-Gazzareen: developments in the Old Kingdom settlement. In: Bowen, G. and Hope, C. (eds.) *The Oasis Papers. Proceedings of the Third International Conference of the Dakhleh Oasis Project*. Oxford: Oxbow Books, 123-129.
- Minar, J. 2001. Motor Skills and the Learning Process: the conservation of cordage final twist direction. *Journal of Anthropological Research* 57, 381-405.
- Mizoguchi, K. 2013. Evolution of Prestige Goods Systems: an application of network analysis to the transformation of communication systems and their media. In: Knappett, C. (ed.) *Network Analysis in Archaeology: new approaches to regional interaction*. Oxford: Oxford University Press, 151-180.
- Moeller, N. 2016. *The Archaeology of Urbanism in Ancient Egypt*. Cambridge: university of Cambridge Press.
- Moreno-Garcia, J. 2013a. The Territorial Administration of the Kingdom in the 3rd Millennium. In: Moreno-Garcia, J. (ed.) *Ancient Egyptian Administration*. Leiden: Brill, 85-151.
- Moreno-Garcia, J. 2013b. The "Other" Administration: patronage system and informal networks of power in ancient Egypt. In: Moreno-Garcia, J. (ed.) *Ancient Egyptian Administration*. Leiden: Brill, 1029-1065.
- Moreno-Garcia, J. 2013c. The Study of Ancient Egyptian Administration. In: Moreno-Garcia, J. (ed.) *Ancient Egyptian Administration*. Leiden: Brill, 1-17.
- Moussa, A. and Altenmüller, H. 1977. *Das Grab des Nianchchnum und Chnumhotep*. Darmstadt: Philipp von Zabern.

- Müller, V. 2012. Do Seal Impressions Prove a Change in the Administration During the reign of King Den? In: Regulski, I., Duistermaat, K. and Verkinderen, P. (eds.) *Seals and Sealing Practices from Ancient Times until Present Day. Developments in Administration and Magic Through Cultures*. Leuven: Peeters Publishing, 17-32.
- Murnane, W. 2000. Response to D. Redford. In: Hawass, Z. (ed.) *Egyptology at the Dawn of the 21st Century. Proceedings of the Eighth International Congress of Egyptologists*. Cairo, 15-19.
- Murray, M. 2011. Archaeological Science 2009. In: Lehner, M., Kamel, M., and Tavares, A. (eds.). 2009. *Giza Plateau Mapping Project Season 2006-2007 Preliminary Report. Giza Occasional Papers 3*. Boston: AERA, Inc., 153-172.
- Neugebauer, P. 1937. Einiges zur Chronologie. *Astronomische Nachrichten* 263, 97-102.
- Newberry, P. 1943. Queen Nitocris of the 6th Dynasty. *JEA* 29, 51-54.
- Nicols, J. 1988. Prefects, Patronage and the Administration of Justice. *ZPE* 72, 201-217.
- Nolan, J. 1998. Sealings from Giza. Globes of Mud with Tales to Tell. *AERAGram* 2, 4-6.
- Nolan, J. 2007a. Main Street Sealings. In: Lehner, M. and Wetterstrom, W. (eds.) *Giza Reports. Giza Plateau Mapping Project. Volume 1*. Boston: AERA, Inc., 179-181.
- Nolan, J. 2007b. Gallery III.4 Sealings. In: Lehner, M. and Wetterstrom, W. (eds.) *Giza Reports. Giza Plateau Mapping Project. Volume 1*. Boston: AERA, Inc., 271-275.
- Nolan, J. 2010. *Mud Sealings and Fourth Dynasty Administration at Giza*. PhD Dissertation. Chicago.
- Nolan, J. 2011a. On the Cusp of a New Dynasty: Khentkawes and Userkaf. *AERAGram* 11, 10-12.
- Nolan, J. 2011b. Five Clay Fragments and Another King. *AERAGram* 11, 12.
- Nolan, J. 2012. A Fifth Dynasty Renaissance. *AERAGram* 13, 2-5.
- Nolan, J. 2013. Piecing the Story Together, One Clay Sealing Fragment at a Time. *AERAGram* 14, 12-14.
- Nolan, J. 2014. A Change of Address: funerary workshop priests move to new quarters. *AERAGram* 15, 29-31.
- Nolan, J. 2018. Sealings and Seals from the Pyramid Age Egypt. In: Ameri, M., Costello, S., Jamison, G., and Scott, Sarah (eds.). *Seals and Sealings in the Ancient World*. Cambridge: Cambridge University Press, 271-288.
- Nolan, J. and Pavlick, A. 2008. Impressions of the Past. Seals and Sealings from Pottery Mound. *AERAGram* 9, 2-4.

- Nyord, R. 2009. Taking Phenomenology to Heart. Some Heuristic Remarks on Studying Ancient Egyptian Embodied Experience. In: Nyord, R. and Kjølby, A. (eds.) *Being in Ancient Egypt. Thoughts on Agency, Materiality and Cognition*. Oxford: BAR Publishing, 63-74.
- O'Brien, A. 1996. The Serekh as an Aspect of the Iconography of Early Kingship. *JARCE* 33, 123-138.
- O'Connor, D. 2014. *The Old Kingdom Town at Buhen*. London: Egypt Exploration Society.
- Olabarria, L. 2020. *Kinship and Family in Ancient Egypt: archaeology and anthropology in dialogue*. Cambridge: Cambridge University Press.
- Oppenheim, A. 1959. On an Operational Device in Mesopotamian Bureaucracy. *JNES* 18, 121-128.
- Pantalacci, L. 1996. Fonctionnaires et analphabètes: sur quelques pratiques administratives observées à Balat. *Bulletin de l'Institut français d'archéologie orientale* 96, 359-367.
- Pantalacci, L. 2005. Sceaux et empreintes de sceaux comme critères de datation. Les enseignements des fouilles de Balat. In: Des Néferkarê aux Montouhotep. Travaux archéologiques en cours sur la fin de la Vie dynastie et la Première Période Intermédiaire. Actes du colloque CNRS – université Lumière Lyon 2, tenu le 5-7 juillet 2001. Lyon: Maison de l'Orient et de la Méditerranée Jean Pouilloux, 229-238.
- Pantalacci, L. 2013. Balat, A Frontier Town and Its Archive. In: Moreno-Garcia, J. (ed.) *Ancient Egyptian Administration*. Leiden: Brill, 197-214.
- Pantalacci, L. 2021. Late Third Millennium Sealings from Balat, Dakhla Oasis: an Overview. In: Engel, E., Blöbaum, A. and Kammerzell, F. (eds.) *Keep Out! Early Dynastic and Old Kingdom Cylinder Seals and Sealings in Context*. Wiesbaden: Harrassowitz Verlag, 241-256.
- Papazian, H. 2013. The Central Administration of the Resources in the Old Kingdom: departments, treasuries, granaries and work centers. In: Moreno-Garcia, J. (ed.) *Ancient Egyptian Administration*. Leiden: Brill, 41-83.
- Pätznick, J. 2005. *Die Siegelabrollungen und Rollsiegel der Stadt Elephantine im 3. Jahrtausend v. Chr. Spurensicherung eines Archäologischen Artefaktes*. Oxford: Archaeopress.
- Peduzzi, P., Concato, J., Kemper, E., Holford, T. and Feinstein, A. 1996. A Simulation Study of the Number of Events per Variable in Logistic Regression Analysis. *Journal of Clinical Epidemiology* 49: 12, 1273-1379.
- Petrie, W. 1883. *The Pyramids and Temples of Gizeh*. London: Field and Tuer, Ye Leadenhalle Presse.
- Petrie, W. 1899. Sequences in Prehistoric Remains. *Journal of the Royal Anthropology Institute* 29, 295-301.

- Petrie, W. 1901. *Diospolis Parva. The Cemeteries of Hu and Abadiyeh*. London: Egypt Exploration Fund.
- Piacentini, P. 2002. *Les scribes dans la société égyptienne de l'Ancien Empire. Vol. 1. Les premières dynasties. Les nécropoles memphites*. Paris: Cybele.
- Piacentini, P. 2003. Scribe. In: Redford, D. (ed.) *The Oxford Encyclopedia of Ancient Egypt*. Oxford: Oxford University Press.
- Piacentini, P. 2008. Scribal Titles in the Third Millennium B.C.: innovations, continuity and transformations. In: Vymazalova, H. and Barta, M. (eds.) *Chronology and Archaeology in Ancient Egypt (The Third Millennium B.C.)*. Prague: Czech Institute of Egyptology, Faculty of Arts, Charles University in Prague, 81-86.
- Pinarello, M. 2015. An Archaeological Discussion of Writing Practice: deconstruction of the ancient Egyptian scribe. London: Golden House Publications.
- Pittman, H. 1997. The Administrative Function of Glyptic Art in Proto-Elamite Iran: a survey of the evidence. *Res Orientalis* 10, 133-161.
- Podzorski, P. 1988. Predynastic Egyptian Seals of Known Provenance in the R. H. Lowie Museum of Anthropology. *JNES* 47, 259-268.
- Porada, E. 1993. Why the Cylinder Seals? Engraved Cylindrical Seal Stones of the Ancient Near East, Fourth to First Millennium B.C. *The Art Bulletin* 75, 563-582.
- Porter, B. and Moss, R. 1974. *Topographical Bibliography of Ancient Egyptian Hieroglyphic Texts, Reliefs and Paintings III Memphis. Part 1 Abu Rawash to Abusir*. Oxford: Clarendon Press.
- Porter, B. and Moss, R. 1981. *Topographical Bibliography of Ancient Egyptian Hieroglyphic Texts, Reliefs and Paintings III Memphis. Part 2 Saqqara to Dashur*. Oxford: Clarendon Press.
- Posener-Krieger, P. and de Cenival, J. 1968. *Hieratic Papyri in the British Museum, Fifth Series: the Abu Sir Papyri*. London: Trustees of the British Museum.
- Posener-Krieger, P. 1975. Le Papyrus de Gebelein: remarques préliminaires. *Revue d'Égyptologie* 27, 211-221.
- Posener-Krieger, P. 1976. *Les archives du temple funéraire de Neferirkare-Kakai (les papyrus d'Abusir). Traduction et commentaire II*. Cairo: Institut français d'archéologie orientale.
- Powell, M. 1992. Review of Schmandt-Besserat, *Before Writing*. *Journal of American Oriental Society* 114, 7-9.
- Quirke, S. 2004. *Titles and Bureaux of Egypt, 1850-1700 BC*. London: Golden House.

- Quirke, S. 2007. The Hyksos in Egypt 1600 bce: new rulers without an administration. In: Crawford, H. (ed.) *Regime Change in the Ancient Near East and Egypt: from Sargon of Agade to Saddam Huseein*. Oxford: Oxford University Press for the British Academy, 123-140.
- Rakic, Y. 2014. Impressions of the Context Scene: glyptic imagery and sealing practices in the Akkadian period. In: Brown, B. and Feldman, M. (eds.) *Critical Approaches to Ancient Near Eastern Art*. Berlin: De Gruyter, 185-204.
- Rakic, Y. 2018. Sealing Practices in the Akkadian Period. In: Ameri, M., Costello, S., Jamison, G., and Scott, Sarah (eds.). *Seals and Sealings in the Ancient World*. Cambridge: Cambridge University Press, 81-94.
- Ramsey, C. 2008. Radiocarbon Dating. *Archaeometry* 50, 249-275.
- Raver, W. 2005a. Instructions of Hordjedef. In: Redford, D. (ed.) *The Oxford Encyclopedia of Ancient Egypt*. Oxford: Oxford University Press.
- Raver, W. 2005b. Instructions of Kagemni. In: Redford, D. (ed.) *The Oxford Encyclopedia of Ancient Egypt*. Oxford: Oxford University Press.
- Raver, W. 2005c. Instruction of Ptahhotep. In: Redford, D. (ed.) *The Oxford Encyclopedia of Ancient Egypt*. Oxford: Oxford University Press.
- Redding, R. 2007a. Preliminary Report on the Faunal Remains Recovered from Feature 21557: the Pottery Mound (SFW-PM). AERA.
- Redding, R. 2007b. Preliminary Report on the Faunal Remains Recovered from Feature 24462: the Pottery Mound (SFW-PM). AERA.
- Redding, R. 2011. Why We Excavate Where We Do: the Western Compound and the Chute. In: Lehner, M. (ed.). 2011. *Giza Plateau Mapping Project Season 2009 Preliminary Report. Giza Occasional Papers 5*. Boston: AERA, Inc., 105-109.
- Redford, D. 1986. *Pharaonic King-Lists, Annals and Day-Books*. Mississauga: Benben Publications.
- Redford, D. 2000. The Writing of the History of Ancient Egypt. In: Hawass, Z. (ed.) *Egyptology at the Dawn of the 21st Century. Proceedings of the Eighth International Congress of Egyptologists*. Cairo, 1-11.
- Regulski, I. 2011. Egypt's Earliest Dynastic Cylinder Seals Reconsidered. *Bibliotheca Orientalis* LXVIII 1, 5-32.
- Regulski, I. 2018. Seals and Sealings as a Reflection of State Formation in Egypt. In: Ameri, M., Costello, S., Jamison, G., and Scott, Sarah (eds.). *Seals and Sealings in the Ancient World*. Cambridge: Cambridge University Press, 258-270.
- Reisner, G. 1931. *Mycerinus: the temples of the third pyramid at Giza*. Cambridge: Harvard University Press.

- Reisner, G. 1942. *A History of the Giza Necropolis I*. Cambridge: Harvard University Press.
- Relaki, M. 2009. Rethinking Administration and Seal Use in Third Millennium Crete. *Creta Antica* 10, 353-372.
- Renfrew, C. and Bahn, P. 2005. *Archaeology: the key concepts*. Routledge.
- Rice, P. 2015. *Pottery Analysis: A Sourcebook, Second Edition*. Chicago and London: University of Chicago Press.
- Ross, J. 2014. Art's Role in the Origins of Writing: the seal-carver, the scribe and the earliest Lexical texts. In: Brown, B. and Feldman, M. (eds.) *Critical Approaches to Ancient Near Eastern Art*. Berlin: De Gruyter, 295-318.
- Rowland, J. 2008. Building Bridges between Radiocarbon, Relative and Historical Chronologies. In: Vymazalova, H., Barta, M. and Altenmüller, H. (eds.) *Chronology and Archaeology in Ancient Egypt*. Prague: Czech Institute of Egyptology, Faculty of Arts, Charles University in Prague.
- Ryholt, K. 1997. *The Political Situation in Egypt during the Second Intermediate Period*. Copenhagen: Museum Tusculanum Press.
- Ryholt, K. 2000. The Late Old Kingdom in the Turin King-List and the Identity of Nitocris. *Zeitschrift für ägyptische Sprache und Altertumskunde* 127, 87-100.
- Ryholt, K. 2004. The Turin King-List. *Ägypten und Levante* 14, 135-155.
- Sadrangani, F. and Kawae, N. 2011. Soccer Field West, House Unit 1, 2009. In: Lehner, M. (ed.). 2011. *Giza Plateau Mapping Project Season 2009 Preliminary Report. Giza Occasional Papers 5*. Boston: AERA, Inc., 135-147.
- Salah, A. 1974. Excavations around the Mycerinus Pyramid Complex. *MDAIK* 30, 131-154.
- Saller, R. 2002. *Personal Patronage under the Early Empire*. Cambridge, London, Melbourne: Cambridge University Press.
- Sax, M., Collon, D. and Leese, M. 1993. The Availability of Raw Materials for Near Eastern Cylinder Seals during the Akkadian, Post Akkadian and Ur III Periods. *Iraq* 55, 77-90.
- Schaefer, B. 1981. *Temples of Ancient Egypt*. Ithaca: Cornell University Press.
- Schaefer, T. 2000. The Heliacal Rise of Sirius and Ancient Egyptian Chronology. *Journal for the History of Astronomy* 31, 149-155.
- Schmandt-Besserat, D. 1992. *Before Writing*. Austin: University of Texas Press.
- Schmandt-Besserat, D. 1996. *How Writing Came About*. Austin: University of Texas Press.

- Schneider, T. 2008. Periodizing Egyptian History: Manetho, Convention and Beyond. In: Klause-Peter, A. (ed.) *Historiographie in der Antike*. Berlin: De Gruyter, 181-196.
- Schneider, T. 2012. Manetho, Egyptian Historian. In: *The Encyclopedia of Ancient History*. Oxford: Blackwell Publishing, Ltd., 1-2.
- Schoep, I. 1999. The Origins of Writing and Administration on Crete. *OJA* 18, 265-276.
- Shaw, I. 2000. *The Oxford History of Ancient Egypt*. Oxford: Oxford University Press.
- Shaw, I. 2013. Pharaonic Egypt. In: Lane, P. and Mitchell, P. (eds.) *The Oxford Handbook of African Archaeology*. Oxford: Oxford University Press, 737-750.
- Shafer, B. 1998. *Temples of Ancient Egypt*. London: I.B. Taurus.
- Shirley, J. 2013. Crisis and Restructuring of the State: from the Second Intermediate Period to the advent of Ramses. In: Moreno-Garcia, J.C. (ed.) *Ancient Egyptian Administration*. Leiden: Brill, 521-605.
- Simpson, W. 2003. *The Literature of Ancient Egypt: an anthology of stories, instructions, stelae, autobiographies and poetry*, New Haven: Yale University Press: 127-148.
- Skeates, R. 2007. Neolithic Stamps: cultural patterns, processes and potencies. *CAJ* 17, 183-198.
- Smith, J. 2014. Histories of Cypriot Art through Seal Carving. In: Brown, B. and Feldman, M. (eds.) *Critical Approaches to Ancient Near Eastern Art*. Boston: Walter de Gruyter Inc., 205-240.
- Smith, S. 1998. The Transition of An Administrative Sealing System from Lower Nubia to Kerma. *Cahier de Recherches de l'Institut de Papyrologie et Égyptologie de Lille* 19, 219-230.
- Smith, S. 2018. Middle and New Kingdom Sealing Practices in Egypt and Nubia: a comparison. In: Ameri, M., Costello, S., Jamison, G., and Scott, Sarah (eds.). *Seals and Sealings in the Ancient World*. Cambridge: Cambridge University Press, 302-324.
- Smith, S. and Buzon, M. 2014. Entanglement and the Formation of the Ancient Nubian Napatan State. *American Anthropologist* 118, 284-300.
- Spence, K. 2000. Ancient Egyptian Chronology and the Astronomical Orientation of the Pyramids. *Nature* 408, 320-324.
- Spencer, N. 2010. Priests and Temples: Pharaonic. In: Lloyd, A. (ed.) *A Companion to Ancient Egypt Vol. 1*. Oxford: Wiley-Blackwell Ltd., 255-273.
- Stein, D. 2006. Paleolithic Iconography on Bronze Age Seals from Mesopotamian Periphery? In: Taylor, P. (ed.) *The Iconography of Cylinder Seals*. London: Warburg Institute, 19-34.

- Stevenson, A. 2015. Telling Times: Time and Ritual in the Realization of the early Egyptian State. *CAJ* 25, 145-161.
- Strudwick, N. 1985. *The Administration of Egypt in the Old Kingdom*. London: KPI.
- Strudwick, N. 2005. *Texts from the Pyramid Age*. Atlanta: Society of Biblical Literature.
- Swift, E. 2012. Object Biography, Re-use and Recycling in the Late to Post-Roman Transition Period and Beyond: rings made from Romano-British bracelets. *Britannia* 43, 167-215.
- Tallet, P. and Lehner, M. 2022. *The Red Sea Scrolls*. London: Thames and Hudson.
- Taylor, J. 2011. Excavations in the Western Compound, 2009. In: Lehner, M. (ed.). 2011. *Giza Plateau Mapping Project Season 2009 Preliminary Report. Giza Occasional Papers* 5. Boston: AERA, Inc., 111-122.
- Tavares, A., Mahmoud, H. and Shehab, E. 2012. Living on a Slope in the Town of Queen Khentkawes. *AERAGram* 13, 20-23.
- Teall, J. 1967. The Age of Constantine Change and Continuity in Administration and Economy. *Dumbarton Oaks Papers* Vol. 21, 11-36.
- Teissier, B. 1987. Glyptic Evidence for a Connection between Iran, Syro-Palestine and Egypt in the Fourth and Third Millennia. *Iran* 25, 27-53.
- Tomkins, J. 2018. The Misnomer of Nomarchs. *Zeitschrift für ägyptische Sprache und Altertumskunde* 145, 95-104.
- Tonnies, F. 2001 (1887). *Community and Civil Society*. Cambridge: Cambridge University Press.
- Torcia, M. 2007. Clay Sealings from the Giza Pyramids Area. In: Goyon, J-C. and Cardin, C. (eds.) *Proceedings of the Ninth International Congress of Egyptologists*. Leuven: Peeters Publishers, 1817-1826.
- Tuplin, C. 1987. The Administration of the Achaemenid Empire. In: Carradice, I. (ed.) *Coinage and Administration in the Athenian and Persian Empires*. Oxford: Bar Publishing, 109-166.
- Türkcan, A. 2007. The Role of Catalhöyük Animal Seals in Neolithic Symbolism. *Documenta Praehistorica* 34, 257-267.
- Van Pelt, W. 2013. Revising Egypto-Nubian Relations in New King Lower Nubia: from Egyptianization to cultural entanglement. *Cambridge Archaeological Journal* 23, 523-550.
- Verbrugghe, G. and Wickersham, J. 2003. *Berosos and Manetho, Introduced and Translated*. Ann Arbor: University of Michigan Press.

- Verner, M. 2006. Dynasties 4 to 5. In: Hornung, E., Krauss, R. and Warburton, B. (eds.) *Ancient Egyptian Chronology*. Leiden: Brill, 124-143.
- Verner, M. 2006. *Abusir IX. The Pyramid Complex of Raneferref. The Archaeology*. Prague: Czech Institute of Egyptology, Faculty of Arts, Charles University in Prague.
- Verner, M., Posener-Kriéger, P. and Janosi, P. 1995. *Abusir III: the pyramid complex of Khentkaus*. Excavations of the Czech Institute of Egyptology. Prague: Universitas Carolina Pragensis.
- Vischak, D. 2014. *Community and Identity in Ancient Egypt: the Old Kingdom cemetery at Qubbet el-Hawa*. Cambridge: Cambridge University Press.
- Von Beckerath, J. 1962. The Date of the End of the Old Kingdom. *JNES* 21, 140-147.
- Von Wickede, A. 1990. *Prähistorische Stempelglyptik in Vorderasien*. Munich: Profil Verlag.
- Vymazalova, H. 2013. The Administration of the Royal Funerary Complexes. In: Moreno-Garcia (ed.) *Ancient Egyptian Administration*. Leiden: Brill, 177-196.
- Vyse, H. 2014 (1840-1842). *Operations Carried on at the Pyramids of Gizeh in 1837*. Cambridge: Cambridge University Press.
- Waddell, W. 1940. *Manetho*. Boston: Harvard University Press.
- Ward, W. 1982. *Index of Egyptian Administrative and Religious Titles of the Middle Kingdom*. Beirut: American University of Beirut.
- Watrall, E. 2019. Building Scholars and Communities of Practice in Digital Heritage and Archaeology. *Advances in Archaeological Practice* 7, 140-151.
- Wegner, J. 2018. The Evolution of Ancient Egyptian Seals and Sealing Systems. In: Ameri, M., Costello, S., Jamison, G., and Scott, Sarah (eds.). *Seals and Sealings in the Ancient World*. Cambridge: Cambridge University Press, 239-257.
- Wendrich, W. 2013. *Archaeology and Apprenticeship. Body Knowledge, Identity and Communities of Practice*. Tucson: University of Arizona Press.
- Wenger, E. 1998. *Communities of Practice*. Cambridge: Cambridge University Press.
- Wenger, E., McDermot, R. and Snyder, W. 2002. *Cultivating Communities of Practice*. Boston: Harvard Business School Press.
- Wengrow, D. 2008. Prehistories of Commodity Branding. *Current Anthropology* 49, 7-34.
- Weingarten, J. 1986. The Sealing Structures of Minoan Crete: MM II Phaistos to the Destruction of the Palace of Knossos. Part I. *OJA* 5, 279-298.

- Weingarten, J. 1988. The Sealing Structures of Minoan Crete: MM II Phaistos to the Destruction of the Palace of Knossos. Part II. *OJA* 7: 1-25.
- Wetterstrom, W. 2011. Digging Again. *AERAGram* 11, 2-3.
- Wetterstrom, W. 2012. Conundrums and Surprises: the Silo Building Complex. *AERAGram* 13, 6-19.
- Wiese, A. 1996. Die Anfänge der ägyptischen Stempel-Amulette. *Orbis Biblicus et Orientalis* 12. Freiburg: Universitätsverlag.
- Wilkinson, J. 1851. *The Fragments of the Hieratic Papyrus at Turin. Volumes 1-2*. London: Richards.
- Wilkinson, T. 2000. *Royal Annals of Ancient Egypt. The Palermo Stone and Its Associated Fragments*. London and New York: Kegan Paul International.
- Willems, H. 2014. *Historical and Archaeological Aspects of Egyptian Funerary Culture*. Leiden: Brill.
- Williams, R. 1972. Scribal Training in Ancient Egypt. *Journal of American Oriental Society* 92, 214-221.
- Winlock, H. 1947. *The Rise and Fall of the Middle Kingdom in Thebes*. New York: Macmillan.
- Witsell, A. 2014. A Return to Area AA: Informal Seals and Sealings of the Heit el-Ghurab. *AERAGram* 15, 32-34.
- Witsell, A. 2018. Kromer 2018: Basket by Basket. *AERAGram* 19, 2-9.
- Wodzinska, A. 2007a. Main Street Ceramics. In: Lehner, M. and Wetterstrom, W. (eds.) *Giza Reports Volume 1*. Boston: AERA Inc., 143-152.
- Wodzinska, A. 2007b. Gallery III.4 Ceramics. In: Lehner, M. and Wetterstrom, W. (eds.) *Giza Reports Volume 1*. Boston: AERA Inc., 237-245.
- Wodzinska, A. 2007c. Preliminary Report on the Ceramics. In: Lehner, M. and Wetterstrom, W. (eds.) *Giza Reports Volume 1*. Boston: AERA Inc., 283-324.
- Wodzinska, A. 2011. Khentkawes Town 2009: Pottery Overview. In: Lehner, M. (ed.) 2011. *Giza Plateau Mapping Project Season 2009 Preliminary Report. Giza Occasional Papers* 5. Boston: AERA, Inc., 173-181.
- Yaeger, J. and Canuto, M. 2000. *The Archaeology of Communities*. London and New York: Routledge.
- Yalcin, S. 2014. *Seals, Identity and Patronage in the Ancient Near East (1550-1050 BC)*. Doctoral Dissertation. Columbia University.
- Yamada, M. 2006. The Hittite Administration in Emar: the aspect of direct control. *Zeitschrift für Assyriologie und vorderasiatische Archäologie* 96, 222-234.

Zettler, R. 1987. Sealings as Artifacts of Institutional Administration in Ancient Mesopotamia. *JCS* 39, 197-240.

Zettler, R. 2007. Dynastic Change and Institutional Administration in Southern Mesopotamia in the Later Third Millennium BCE: evidence from seals and sealing practices. In: Crawford, H. (ed.) *Regime Change in the Ancient Near East and Egypt: from Sargon of Agade to Saddam Huseein*. Oxford: Oxford University Press for the British Academy, 9-35.

Zimansky, P. 1993. Review of Schmandt-Besserat, *Before Writing*. *Journal of Field Archaeology* 20, 513-517.

Covid-19 Brief

Covid-19 developed into a world-wide pandemic in 2020. This was the same year I began to write my dissertation. The inability to obtain access to records and literature in the Bodleian Library and other libraries made the process of writing difficult. I did not have access to all of the sources I needed or wanted, and I could not double check or even gather more information on some of my notes (made from previous trips to the library prior to the Covid-19 pandemic). Perhaps the single most frustrating aspect was my inability to refer back to Pätznick's *Siegelabrollungen und Rollesiegel* (2005) to provide additional, concrete examples of sealing types and seal glyptic. These examples were not necessary to the fundamental purpose of my study because I obtained good examples from other sources, but I felt they would have made my work more complete.